THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1909.] LONDON, DECEMBER 12, 1899. [51ST YEAR. PRICE 6d.

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(Maker to the Admiralty),
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SHEFFIELD.

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Patent Portable Forges, Vices, & Vice-Benches, Patent Tue Irons, Anvils, Swage Blocks, &c.

Stocks and Dies, Hammers, and Smiths' Tools in general.

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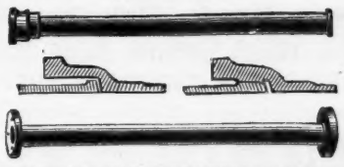
1¼ to 12 IN. BORE.



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Bonlea Foundry,
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Formerly Springbank Iron-Works, Glasgow.
ESTABLISHED 1843.
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Prices and Analysis of all the Scotch Cannels on Application.

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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.

The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.

LE GRAND & SUTCLIFF,
HYDRAULIC ENGINEERS, 100, BUNHILL ROW, LONDON, E.C.

THE Utilization of Towns' Refuse for some practical purpose has been successfully solved; and there is, therefore, no reason why every township should not have its own Electric Light Installation, and obtain the power from its Dust-Bins.

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ORDERS NOW ON HAND—
DARWEN, LANCS., 8 cells; 2 Lancashire Boilers, 30 feet by 8 feet—200 lb. pressure.
SHIPLEY, YORKS., 4 cells; 1 Lancashire Boiler, 30 feet by 8 feet.
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Write for full Particulars, stating Weight of Refuse per annum, and for what purpose you would wish to use the Power, when we shall be glad to submit a suitable Scheme.

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Wrought-Iron Roofs, Bridges, Girders, &c.,

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With Improved Centre-Valves, to work either One, Two, Three, or Four Purifiers at one time.

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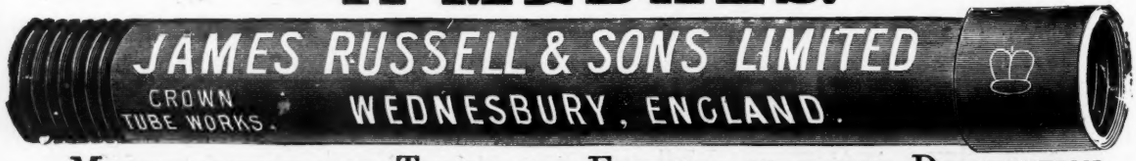

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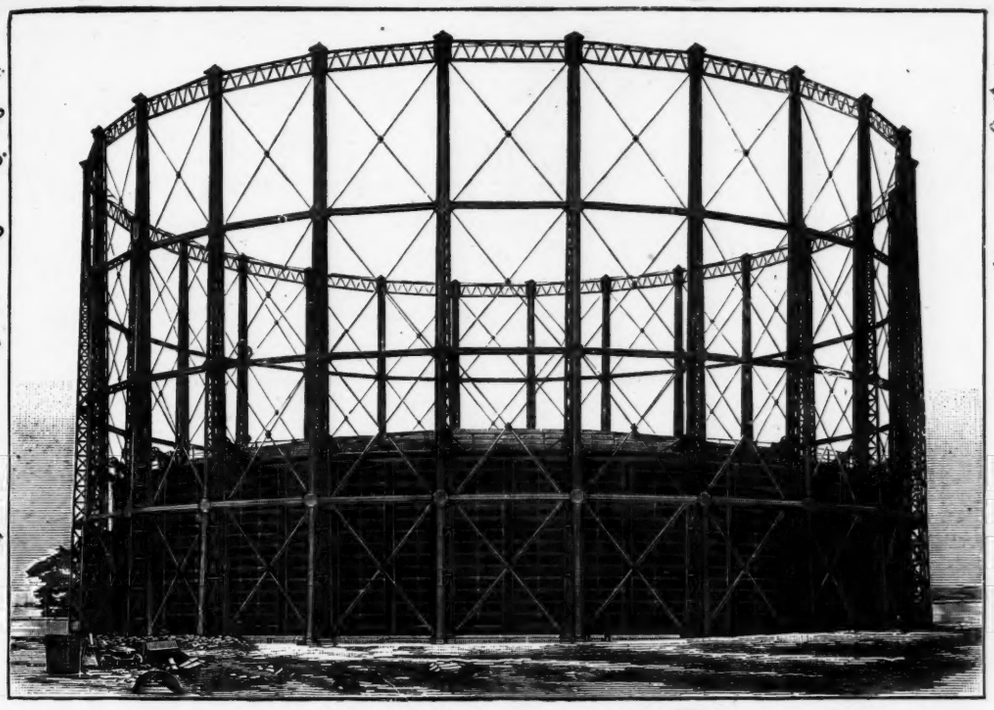

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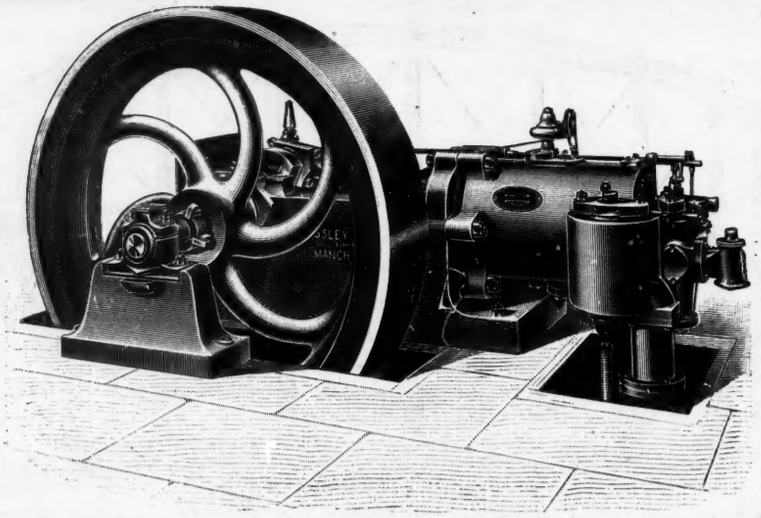

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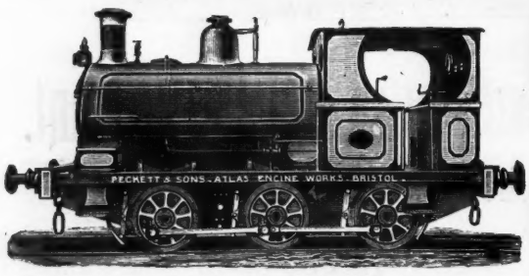

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NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

This is the Burner exhibited at Niagara Hall, London, and throughout the Provinces.

The New Welsbach Burner is used without a Chimney.

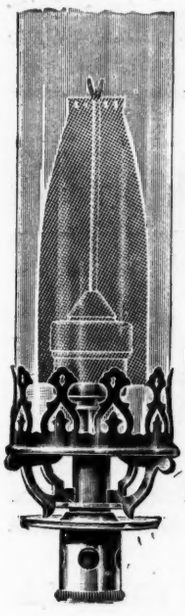
Suitable for Indoor and Outdoor Lighting.

Supplied in SIX Sizes,

Consuming from ¾ to 7 Cubic Feet of Gas per Hour.

Price from 5/- upwards.

MANTLES from 9d. each.



"C" WELSBACH BURNER.

REDUCED PRICES.

"C" Ordinary Burner, 5s. 0d.

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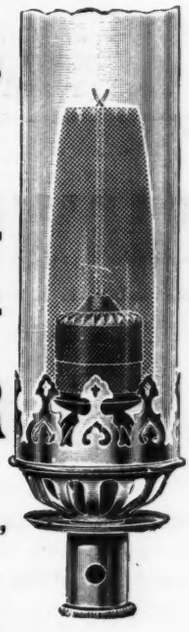

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A CHEAP FORM OF THE "C" BURNER.

50 to 60 Candle Power with 3½ to 3¾ Cubic Feet of Gas,

Price complete with MANTLE and CHIMNEY, **4/-.**

MANTLES FOR "YORK" BURNER, **1/-** EACH.

ALL THE ABOVE PATTERNS CAN NOW BE SUPPLIED.

Complete Price List on Application.

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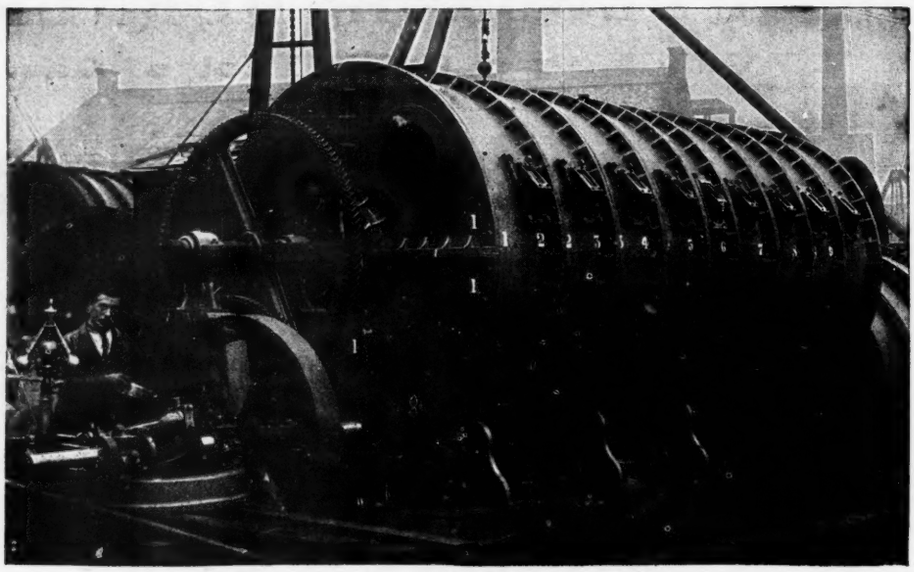
W. C. HOLMES & CO.'S
PATENT "NEW" SCRUBBER-WASHER

HORIZONTAL TYPE.

Machines of this and Vertical Type erected last year and now on order, equal to 62,920,000 cubic feet.

Results guaranteed.



TELEGRAMS: "Ignitor, London." "Holmes, Huddersfield."

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NOTE.—Since Improvements patented in 1895-1897, **77 MACHINES**, equal to a daily Capacity of **80,150,000 CUBIC FEET**, have been erected, or are at present on order.

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FOR ENRICHING GAS IN BULK.
OVER 60 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

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MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

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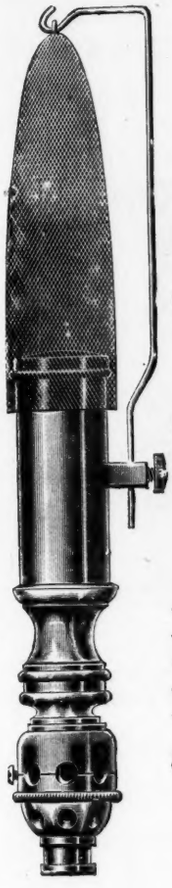
THE

INTENSIFIED GAS LIGHT COMPANY, LTD.



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The only System actually giving over

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Three Burners consuming 30 cubic feet per hour give a Light of 1000-Candle Power at half the cost of Electric Light.

Specially adapted for Lighting Railway Stations, Docks, Sheds, Workshops, Streets and Squares, Shop Windows, &c., &c.

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"The perfection of artificial lighting on the large scale."—"*Journal of Gas Lighting*," April 18, 1899.

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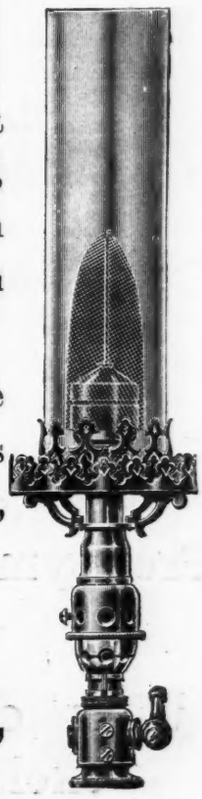

The Intensified Company's Improved Incandescent Burner gives the marvellous results of 25 Candles per foot, 60 Candles for $2\frac{1}{2}$ feet. No other Burner on the Market can compare with this. Price, with Mantle and Chimney, from 6s. 6d. Send for Complete Lists.

The most Effective and Economical Burner on the Market for both Indoor and Outdoor Lighting. Mantles specially manufactured for the Company, for both Systems, by the Welsbach Incandescent Gas-Light Company.

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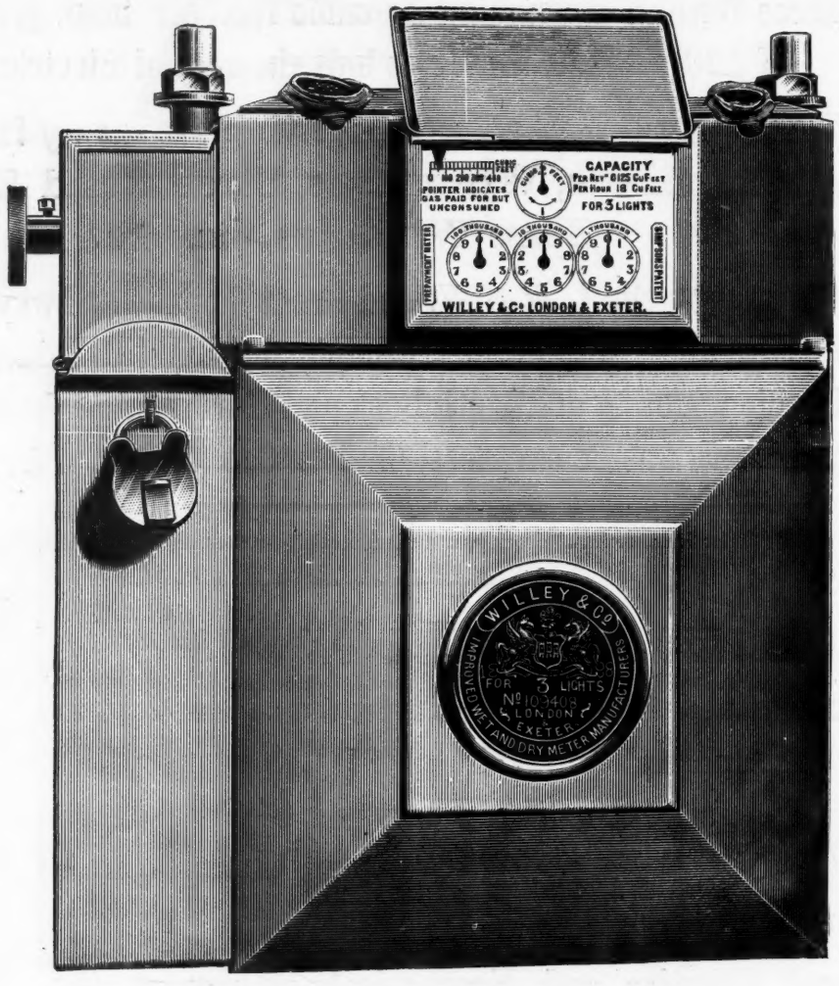

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Prepayment Meters for any coinage, unexcelled for Accuracy and Reliability.

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We Undertake Contracts for Complete
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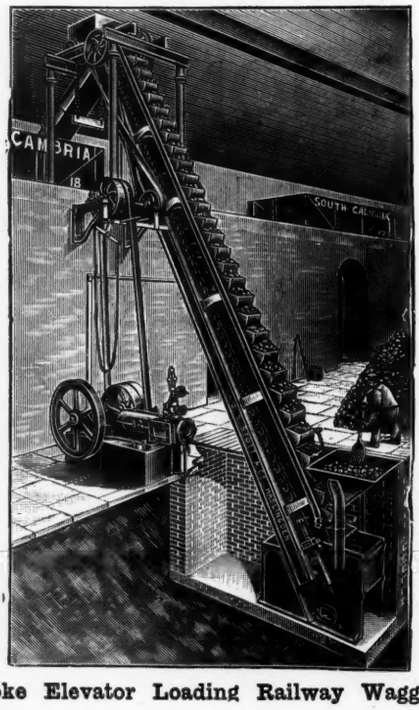

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HIGH-CLASS **STEAM-ENGINES** up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

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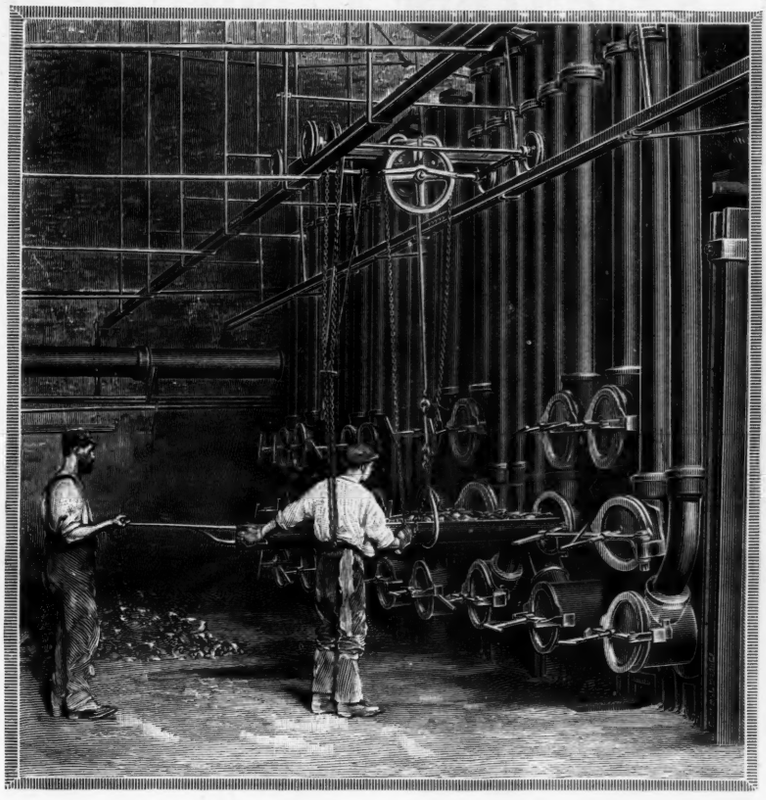
THE "RAPID" MANUAL CHARGING APPARATUS.

JUST ERECTING TWO "RAPID" CHARGING MACHINES AT Kidderminster



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THIS MACHINE CAN BE SEEN AT WORTHING AND TRURO GAS-WORKS.

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OF EVERY DESCRIPTION:
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MANY INSTALLATIONS.
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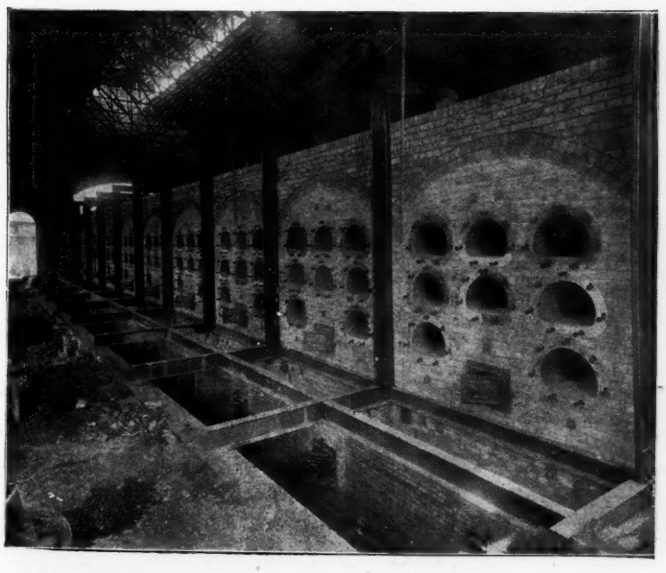
BUILDINGS, ROOFS, &c.



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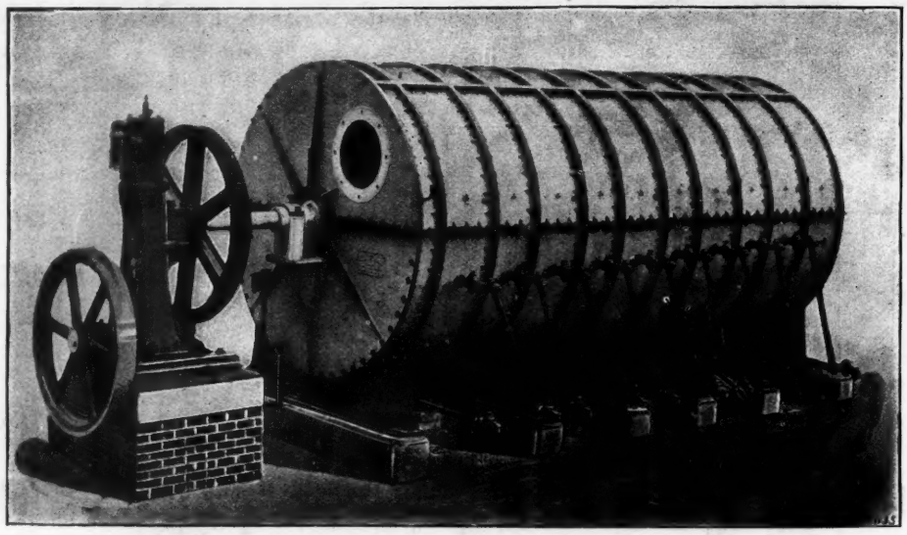
PATENT "STANDARD" WASHER-SCRUBBERS

Complete Extraction of Ammonia and large proportion of CO_2 and H_2S.

Maximum Strength Liquor produced, Minimum Water Supply and Driving Power required.



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SQUARE STATION METERS WITH PLANED JOINTS.

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1830.

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	Cub. Ft. Daily.		Cub. Ft. Daily
Copenhagen	700,000	Commercial Gas Co.	850,000
Copenhagen (Second Contract)	2,500,000	Commercial (Second Contract)	850,000
Belfast	1,700,000	Commercial (Third Contract)	1,250,000
Belfast (Second Contract)	4,500,000	L. & N.W. Railway, Crewe	700,000
Brussels	700,000	Taunton	225,000
Brussels (Second Contract)	700,000	Lawrence, Mass.	400,000
Liverpool	3,500,000	Rotterdam	850,000
Liverpool (Second Contract)	4,500,000	Dorking	125,000
Tottenham	750,000	McKeesport, Pa.	500,000
Tottenham (Second Contract)	750,000	The Gaslight and Coke Co., Bromley	3,750,000
Santiago de Cuba	400,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Swansea	750,000	Durham	200,000
Manchester	3,000,000	New York (Remodelled)	11,000,000
Brighton	1,750,000	Scarborough	800,000
Preston	1,500,000	Perth, W.A.	125,000
New York	1,200,000	Bremen	550,000
Southport	750,000	Maidenhead	225,000
Bath	1,000,000	Epsom	225,000
Newburgh, N.Y.	350,000	North Middlesex	150,000
Newburgh, N.Y. (Second Contract)	250,000	Wandsworth and Putney	1,800,000
Hoylake	125,000	Aarhus	800,000
Coventry	600,000	Falmouth	150,000
Coventry (Second Contract)	600,000	Southampton	800,000
Bordentown, N.J.	125,000	Hartlepool	750,000
Winchester	200,000	Utrecht	1,000,000
Shanghai	225,000	Deventer	150,000
Stockport	500,000	Portsmouth	1,000,000
Norwich	1,000,000	Bournemouth	1,000,000
Holyoke, Mass.	600,000	Aylesbury	150,000
Lea Bridge	350,000	Hamburg	1,750,000
Lea Bridge (Second Contract)	350,000	Dublin	2,000,000
Stockton-on-Tees	500,000	Redhill	275,000
St. Joseph, Mo.	750,000	Posen	450,000
Edinburgh	2,000,000	Dunedin (N.Z.)	150,000
Guildford	350,000	Stockport (Second Contract)	500,000
Brentford	1,200,000	Brighton (Second Contract)	1,750,000
Bridlington	125,000	Croydon (Second Contract)	625,000
Syracuse, N.Y.	850,000	Maidenhead (Second Contract)	225,000
Middlesbrough	1,250,000	The Gaslight and Coke Co., Beckton	2,250,000
Croydon	1,250,000	The Gaslight and Coke Co., Fulham	1,750,000

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EDITORIAL NOTES.

Expiration of the Welsbach "Pioneer" Patent of 1885.

THE date of this present issue of the "JOURNAL" is to be commended to the particular notice of that large proportion of the inhabitants of the United Kingdom and the Isle of Man who are interested in gas lighting, for the reason that it is the beginning of the new era consequent upon the expiration yesterday of the term of the Welsbach "master "patent" for incandescent gas lighting "mantles," which bears the date of Dec. 12, 1885. It is worth while, in view of the intrinsic interest of the subject, and the actual condition of the trade in this particular gas speciality, to briefly set out what appears to be the true situation now existing. To begin with incontestable facts, on Dec. 12, 1885, Dr. Auer von Welsbach applied for a British patent for his invention, which was the manufacture of "an illuminant "appliance for gas and other burners consisting of a cap "or hood made of fabric impregnated with the substances "mentioned, and treated as set forth." The substances in question were certain refractory and rare earths; and the patentee told the world how to make with these a skeleton of a fabric of suitable form to give useful and economical light by incandescence at the heat of an atmospheric gas-flame. His method was to make a solution of the substances, as soluble nitrates, with which to impregnate a textile or other fabric of suitable material and form. This framework, when ignited, burnt away and left a skeleton of itself, in which the nitrates of the impregnating fluid were converted by the same operation into oxides. A very wide range of substances was appropriated to this use by Dr. Auer; and in the great suit by which, more than ten years later, the validity of this patent was duly tested, the Judge declared that "for all practical pur-"poses, Welsbach discovered a practical and simple "method of arranging oxides, to be rendered incandes-"cent, in a shape which made it possible to use them in "burners, and also discovered that a class of substances—"which for convenience and brevity are generally spoken "of by chemists, also throughout the hearing of this case, "as 'rare earths'—would afford at once, when blended "with zirconium, the necessary illumination and the neces-"sary coherence."

This was the invention that was protected by the patent No. 15,286, dated Dec. 12, 1885. It expired by efflux of time yesterday; the law being that the date of a patent is the date of the application for the same, and that "the day of "the date must be reckoned inconclusively" (Wallace). What was it that this original patent covered, by disclosing, and consequently has now become common property? With all due diffidence, we venture to follow Mr. Justice Wills's decision in this regard. The Judge held that the invention was not in the "prescription," apart from the rest of the process. It was not the construction of the incandescent substance of anything, or even of anything that would answer the purpose of giving good and durable incandescence; but it was the combination of the various essential elements in the process described, the manufacture of the mantle out of the substances mentioned by the patentee, by the means and in the proportions indicated—"including, of course, all such variations of proportions or "of strength of solution as are fairly within the specifica-"tion as it would be understood by competent workmen," and brought into use in the manner indicated.

This invention was adjudged to be meritorious; and the patent for it was declared to be valid. Its merit was questioned, upon the ground that a good result could not be obtained by working in accordance with the directions of the specification. This impeachment, however, failed, in a distinctly dramatic way. Samples of Dr. Auer's impregnating fluid of the oldest known date were employed by Mr. Swinburne in the manufacture of test mantles in the course of the trial, in 1896, and made very good mantles, yielding a duty of nearly 10 candles per cubic foot of gas burnt. Consequently, the Judge held that "the "proportions actually given are right, and work satisfac-"torily." In another place, it was allowed that Welsbach's limits of proportion were "very large." Over and over again, the Judge declined to bind down the patentee to his own "prescription." Welsbach's was of the rank of a "pioneer" invention—a high and noble classification attained by very few. He may have attached—as he did attach—mistaken importance to the value of one or other

ingredient or step in the preparation—that was decided to be immaterial. The Judge found that Welsbach had the substance of his invention right, and that it was rightly described; and he therefore upheld the patent.

This, then, is the patent that has lapsed. Obviously, the wider the patent, the more there is thrown open by its disappearance. There cannot be two scales of valuation for a patent—one for use while it is in existence, the other to come into application after it is dead. It is not for us to state categorically how the lapse of the "pioneer" patent is going to affect the incandescent gas-lighting interests, whether general or particular. It is safe only to say that, whatever Dr. Auer von Welsbach alone could have done up to to-day under this patent, all the world is now at liberty to do. But exactly what this might be, is "another story."

Trade Unionism and Rates of Wages.

WHEN one party to an amicable controversy about nothing of any practical moment, begins to accuse the other of falling short of his "usual courtesy," it is time to drop the subject. This is what our correspondent "F. G. N." does to-day; and we must consequently decline further discussion of the interesting, but scarcely "burning" question of whether we are justified in habitually holding Trade Unionism, as a working force in the industrial world, in profound distrust. Journalistic "views" on such a subject do not matter much, and certainly have not the smallest influence either way upon the settlement of those concrete instances of Trade Union action with which individual employers have to deal from time to time. Our quotation from Pope was only intended to point the argument as to the futility of discussing political matters in the abstract. Rightly or wrongly, we cannot so treat Trade Unionism. By a remarkable coincidence, these latest numbers of the "JOURNAL" through which our controversy has been running, contain a striking illustration of the actual operation of Trade Unionism at the gas-works of the Glasgow Corporation. In our last week's issue, moreover, we gave some interesting information obtained from "Engineering" which shows what Trade Unionism means in the trades connected with building in the United States. Employers of labour, and those seeking the progressive advancement of industry, naturally pay more heed to these things than to theorizings of the "bundle of sticks" order. The cause of Trade Unionism "in the abstract" took the public mind hugely in 1888-9. The reviews, the magazines, and the newspapers were all full of it. The idea is almost as attractive as those conveyed by the "Liberty, Equality, "Fraternity" cry of the French revolutionaries. The world knows what the latter meant in practice. Employers have painful experience of what the former means also; and the "JOURNAL" is one of the agencies for promulgating this knowledge, in every case and always with rigid regard for concrete facts.

These columns might be searched in vain for any *a priori* or abstract condemnation of the idea of Trade Unionism or Trade Unionists. Indeed, even when such proceedings of a Trade Union as those revealed in *Allen v. Flood* have come under condemnation in our pages, we have not failed to acknowledge the address and merit—viewed from the Society standpoint—of Mr. R. Knight, who was the guiding spirit of the Trade Union involved in this leading case. Nobody, moreover, can deny that, in certain close occupations, combination of all the available workers is competent to force up wages. It is so, for example, in gas-meter manufacture. We must stick to our observation, however, that this means of forcing up wages is of limited efficacy, and in its ordinary operation has no reference to the possible existence of "hard and selfish employers." That sentimental notion of the justification of Trade Unionism lacks in proof. On the contrary, an employer may be as "hard "and selfish" as he likes, provided he does not infringe the Society rules, and the Society will not touch him. He may refuse to take apprentices; be utterly regardless of his employees' welfare outside the law; he may discharge every man the moment he passes his prime—and his house will still be rated as "fair" in Union books. It is satisfactory that Mr. Livesey has himself written to put our correspondent right as to the facts of the introduction of the eight-hour shift in London gas-works. It is distinctly comical to offer a Hyde Park mass meeting as a proof of anything beyond itself.

It is useless to talk of what employers and employed might, could, would, or should do if the beautiful dream of Trade Unionism only came true. As a matter of fact, it does not show the slightest indication of realizing itself along the lines which, in our correspondent's belief, "educa-"tion and experience" will eventually lay down. We wish it did. It would be a fine thing if workpeople could unite for good ends, and not apply the power of union amiss. Similarly, as the same writer has remarked, it would be nice if people in a certain line of business could only agree to act together in a legitimate way to make their own markets. Unfortunately, these things cannot be done in practice. Sooner or later, one party wants to do something of which the others disapprove; and then there follows trouble.

As regards employees' "defensive" organization, it is sufficient to note that it is this tendency to go wrong which is held to exclude everything of the kind from the national Services. In theory, soldiers and sailors might combine for their own defence. Practically, everybody can see that no such arrangement would work in the Army or the Navy; and we certainly have yet to learn that it works well in gas manufacture. Whatever its motives, a Trade Union which is anything more than a Friendly Society makes for disaffection in the forces of industry. At best, it divides the allegiance of the workman to his employer. It is unnecessary to specify what it is at its worst. No man, not even the British workman, can serve two masters. When these two—the employer and the Union executive—come into conflict, it is always and necessarily the latter that is obeyed. To transgress an order of his Union, however unreasonable he may know it to be, is more than a Society man dare do, on pain of losing his part in it. No industrial body, no organized employment thus divided against itself can stand as firmly, or move as freely, as one that knows no division. Therefore, it is impossible that an industry so hampered can be as well directed, or administered, as one that is free.

And this brings us to our last point: What is the true meaning of Pope's declaration? Pope, as we take it, certainly did not mean to say that any one of numerous forms of government existing which happened by accident to be the best administered was the best; but that the form which lent itself to, and evoked, the best administration was the best. Experience and reason confirm this, the larger of the two readings of which the line is susceptible. Such extremely condensed language is liable to misconstruction. Finally, the best excuse that can be made for militant Trade Unionism only shows it as a remedy for certain evils which is worse than the disease. But that is another thesis which there is no present need for discussing, even if we could spare space for the citation of those concrete examples by which alone a convincing argument could be sustained.

Coal Miners Wages and the State of Trade.

THE import and export returns for the month of November mark no decline, but rather a further substantial increase in the volume of trade, which continues extraordinarily active. The imports show an advance of £2,176,000, or more than 5 per cent., over the same month last year; while the exports—excluding the value of ships built for foreign countries, not taken into account twelve months ago—have increased by £2,922,000, or equal to nearly 15 per cent. upon the corresponding figures for 1898. Both in imports and exports the percentage of increase for last month is higher than that for the whole period of eleven months this year. There is, therefore, no indication as yet that the tide of commercial prosperity has reached high-water mark. The increases we have set out do not, of course, represent a proportionate swelling of the volume, as distinguished from the value, of our commerce, for much of the money increase is due to the sharp rise in prices. This is illustrated by the fact that the exports of coal have increased 16·2 per cent. in value, but only 1·6 per cent. in tonnage; while the iron and steel exported show a rise of 36·8 per cent. in weight, but 50·5 per cent. in money. The Board of Trade statistics, it is to be observed, deal only with our commerce with other countries, and are referred to as being indicative of the condition of trade generally. If any statistics were available of the business done in this country during the year nearing its close, we believe they would be even more conclusive as to the nation's prosperity. A consideration of the condition of the coal trade provides really sufficient evidence; for that reflects very

faithfully the general situation—coal being a vital necessity to so many industries.

Our readers will need little reminding of the fact that there is almost a famine in coal, in spite of an unprecedentedly large output. It is hardly an exaggeration to say (and this matter is referred to in another paragraph to-day) that gas coal cannot be bought, be the offer to deal never so tempting; for many coal raisers and merchants are hard put to it to even fulfil their existing contract obligations. They have been subjected to much temptation to starve those of their buyers who contracted earlier in the year; for prices have risen so smartly that the contractor would have been something more than human—and what contractors are there superior to the temptations of humanity?—who kept his deliveries close up under (say) a 12s. contract, with an offer of 16s. or 18s. a ton lying on his desk. Now that buyers are clamouring for delivery, however, the over-sold colliery owner dare not sell another ton; and the market is therefore practically empty of sellers. Contractors are, we learn, in many instances so far behind with their shipments to London that a fortnight of cold fog—increasing the consumption of gas and delaying navigation—or a succession of gales such as hampered shipping last week, would create a situation of much anxiety, if not actual difficulty, for gas managers in the Metropolis. The present is essentially a time when a man discovers that as he does so is he done by.

The fact that the present is a golden year for the coal trade is very plainly evidenced by the result of the meeting of the Miners' Conciliation Board at Westminster Palace Hotel last Thursday. It will be remembered that the wages at present paid in the Federation districts are at the rate of 40 per cent. higher than the "standard" of 1888—being determined by the Conciliation Board, which, formed at the commencement of the present year, has power to fix wages at not less than 30 per cent., nor more than 45 per cent., above the 1888 rates. A few weeks back the men put forward a claim to a further advance of 5 per cent. on the 1st prox.—being the maximum they could receive under the present arrangement. The masters were reported to have determined to strenuously resist this claim; but at last Thursday's meeting of the Board, after a somewhat lengthy sitting, it was resolved that, conditionally upon the owners and men represented on the Board agreeing to grant a further term of existence to the Board for three years from Jan. 1, 1901 (the date of the expiration of the present agreement), the advance of 5 per cent. asked by the men should be granted as from the first making-up day in January next. Moreover, it was agreed that the Board should recommend to their constituents that, on the renewal of its term of office as proposed, the maximum rate the Board should have power to grant should be 60 per cent. above the standard, instead of 45 per cent. as at present; no alteration being made in the minimum. As there can be little doubt that the proposals set out will be agreed to, the men will in January be receiving higher wages than they have ever enjoyed; while the increased possible maximum is a very substantial concession on the part of the masters. The men have, therefore, every reason to be satisfied; the masters have, by their concessions, given evidence that they are well pleased with the state and prospects of their trade; while outside all this satisfaction and prosperity the gas manager can only stand and try to relieve the gloominess of a season of high prices and high wages—which never mean, for gas undertakings, high dividends—by a patriotic rejoicing in the welfare of the nation.

The Shortage of Coal.

THE year is drawing to its close under many remarkable conditions; and not the least portentous, unforeseen, and far-reaching of these is the shortage of coal throughout the country. At the moment of writing, we hear from all sides not only that gas coal has gone up to famine prices, but that it is not to be had for money or in fulfilment of contracts. Everywhere gas managers have had to trench upon their precious stocks; and those who were caught at the oncoming of winter with low reserves, must be going about with very long faces. There has been nothing like it since just a quarter of a century ago; and why it should be so now, is more than anybody can satisfactorily explain. Some experts say one thing, and some another; but the truth of the matter probably lies in a concatenation of causes all tending one way. The colliers are reaping a harvest; and their employers have just agreed that the fat time is to last for three years. How the arrangement would stand the strain of a general fall of values, is a curious inquiry which it may be hoped will not be submitted to the test. Gas manufacturers do not mind paying the fair market price for coal; and when the market happens to be a rising one, they have no reason to complain, being sellers as well as purchasers of fuel. Gas-works residuals, besides coke, moreover, never failed to sell well when coal was dear. But all this is no comfort to a gas manager who is short of coal. Even worse off than the gas manufacturer is the central station electric lighting provider. He has to pay "through the nose" for any coal he can get; he has no residuals to help his balance-sheet; and the chances are that he gets hauled up for creating a smoke nuisance. If, as the cynical saying runs, there is something not wholly displeasing to us in the misfortunes of our friends, gas men and electricians would derive mutual gratification from each other's society at the present juncture. The shortage of coal hits the electrician in more places than one. The progress of electrical engineering which figures so elegantly in presidential addresses, has a secret dependence upon the adequacy and reliability of the supply of the very best Welsh steam coal; and when this fails, the wheels do not go round fast enough to meet the demand, and the chimneys smoke. In certain parts of London, the electric light has failed at different times for weeks past, owing to the impossibility of keeping up steam with the fuel procurable. Even Sir W. B. Richmond must now be impressed with the terrible power of that engine of the law which it is in the province of local authorities to set in motion against the perpetrators of smoke nuisances, in connection with recent proceedings at the Westminster Police Court. The Westminster Electric Supply Corporation were prosecuted, for the third time, for having smoky furnaces. There was no defence. The Company admitted the offence, and only pleaded that they could not help themselves. They could not get smokeless coal, and urged that their first duty was to supply the public with light. The Magistrate denied this; saying that "the "first obligation is not to poison the atmosphere with foul "smoke." Of the two previous convictions, one resulted in an abatement order, the other in a fine of £10. Hereupon the Magistrate said: "The penalty goes on increas-"ing. This time it must be a fine of £20, and a guinea "costs." The prospect thus opened up is appalling. It is the "nails in the horseshoe" over again, with a vengeance.

Mr. Chamberlain as Art Critic.

THE public men of this country are called upon to do a vast amount of miscellaneous work. It is a marvel how well the best of them come out of the ordeal. At the present moment, for example, Mr. Chamberlain might be supposed to have enough to think about in respect of his charge at the Colonial Office. Yet at Leicester the other day he was fain to defend the Workmen's Compensation Act; and last week Birmingham wanted him to distribute the prizes to the students of the local School of Art, which entailed a speech upon the place of Art training in the work of the world. Mr. Chamberlain might well have asked what business he might be supposed to have in "that galley." But he was there, all the same; and he succeeded in saying some things well worth marking. After poking a little fun at the high-angled æsthetic attitude in regard to Art, Mr. Chamberlain went right over to the prophets, and admitted that the surpassing ugliness of common things is one of the blots upon modern civilization. "There seemed to be an almost "continuous deterioration from the time of Queen Anne; "and going back farther still, they found this falling off "until it reached its *acme* in the early days of the reign of "Queen Victoria, in a condition of hideous ugliness and "vulgarity which had never been paralleled in the history "of the world." Yet all the time the material prosperity of the people was increasing. It is the function of Art Schools to revive and instruct the taste of the people, in regard to manufactured articles and common things. As a newspaper appreciation of this address admits, "This is still our great "want in England—to give common things a touch of beauty "—common lamp-posts, even common lodging-houses." Why not? Beauty costs nothing, and is an everlasting joy. Commonness is not incompatible with the utmost perfection. Nor does the multiplication of a pattern, as of a lamp-post or other object, by machinery, necessarily turn

good art into bad, although it subjects the charm to a severe strain. Machine reproduction has come to stay; and we must make the best of it. But if our so-called artists were equal to the occasion and the age, they would make the world bless the facilities that exist for disseminating true copies of their works far and wide. The British Royal Academy has gone wrong in concentrating the popular love for, and appreciation of, Art to mere pictures, to be hung upon a wall and exhibited for shillings. A good lamp-post design is capable of giving wider satisfaction than many oil paintings; but the disproportion of daubers to modellers is great—thanks, largely, to the Royal Academy and its congeners.

WATER AND SANITARY AFFAIRS.

It is rather a curious coincidence that just now both London and Paris are concerned with questions of water supply and drainage. Here, on the one hand, we are anxiously awaiting the issue of a report which it may reasonably be expected will offer some definite suggestions as to the future control of the Water Companies' undertakings; and, on the other, we are confronted with a gigantic scheme for bringing to the Metropolis, at enormous cost, a supply of water from a distant part of the country, while flowing at our doors we have a river the watershed of which is believed to be adequate to meeting the requirements of London for some years. It has been urged, and not without reason, that the necessity for the scheme has not yet been proved. There exists, it is true, a certain sentimental objection to Thames water, although it is thoroughly purified before being delivered to the consumers; and therefore Londoners have much less cause for manifesting aversion to it than Parisians have for being alarmed when they learn that Seine water is to be turned on. Happily, this is only occasionally done; and the river has been gradually abandoned as a source for the supply of potable water. But distant rivers—the Loing and Lunain—have had to be drawn upon to furnish the additional water needed by the increased population; and, judging from what has lately been published, the inhabitants are paying very dearly for it. The story of how this extra supply of water is being brought into the city has recently been characterized by a London evening paper as a "perfect tragi-comedy" which it is thought may be studied with considerable advantage by our "municipal "wiseacres." The ratepayers of Paris appear to be regarded as fine game for plunder; and, rather than go to law, they pay demands for compensation all round. Two mills on the Loing have already been bought; and now a third has to be acquired for something over £5000. The works in connection with the water scheme are necessarily attended with noise and dirt; and the inconvenience caused thereby to one Municipality led them to claim £1000 as compensation, which they obtained. Moreover, the City will have to make good all disturbances of public roads. This is not all. A certain portion of land in the Forest of Fontainebleau is required in connection with the scheme. Here the City comes into contact with the State, and, to its cost, finds it to be more exacting in its demands than the other claimants. We are told that not only is an enormous price charged for the land, but also for the wood and undergrowth cut down in the course of the operations. These are perhaps contingencies which are inseparably associated with the carrying out of works of any magnitude; but, all the same, they add to the total cost. Our contemporary hopes the new supply will be ready for the Exhibition next year; but, even if it is, it will, it is said, be "worth its weight in gold."

A few months ago, there was considerable rejoicing over the fact that, at length, all the sewage of Paris had been diverted from the Seine, and would thenceforth be treated at Gennevilliers and other places in the environs. The sewers of Paris, as everybody knows who has visited the city, are regarded as one of the "sights;" and truly they are monuments of the engineering ability of M. Belgrand, under whose supervision they were constructed. But while they are adequate to convey the sewage to its destination, it has been found that insufficient provision has been made for its treatment at the "farms," though these are stated to be 12,500 acres in extent, and capable of receiving 44,000 million gallons of sewage—something like 4400 million gallons in excess of the estimated quantity for the present year. Yet only a few weeks ago one of the farms—and, in fact, the whole neighbourhood—had been so saturated with sewage that it had become a pestilential swamp. The Paris Correspondent of the "Pall Mall "Gazette," describing the scene, stated that the wells of the locality were full of sewage, and that water had to be supplied to the inhabitants from carts sent round at the expense of the Municipality of Paris. The gardens were stated to be "quagmires of sewage," and the cellars of the houses "inundated by a slimy, evil-smelling fluid." This was a too literal realization of the old sanitarians' ideal —"the sewage to the soil." Of course, the explanation is that there had been a miscalculation as to the absorptive capacity of the ground at this particular farm, though no doubt the engineers brought the very highest mathematical knowledge to bear on the subject. Assuming the soil to have been porous, it would probably have soaked up the quantity of sewage water—some 11 or 12 million gallons—poured on to it daily; but, unfortunately, it was composed in parts of clay and rock, which had no affinity for such stuff, and allowed it to run into the adjoining land. It is a pity that due consideration was not given to the geology of the district before it was selected for a purpose for which it seems altogether unfitted. Here in London our drainage system is by no means adequate, as evidenced by the decision come to by the County Council last Tuesday to spend at once £1,250,000 (to be eventually increased to £3,000,000) on its extension; and by our present method of disposing of the sewage we may be casting into the sea a valuable fertilizing agent. But whenever any different system is adopted, it is to be hoped it may not be attended with the risk of such unpleasant incidents as the one which has been troubling our neighbours across the Channel.

At the time of the severe drought of the past summer, allusion was made in these columns on several occasions to the straits in which the Water Committee of the Birmingham Corporation found themselves to meet the demands of the consumers. It was only to be expected, therefore, that the report of the Committee which came before the City Council last Tuesday should contain some reference to the difficulties encountered and the prospects of obviating them in the future. Having works capable of maintaining continuously a supply of only 20 million gallons a day, and at the same time an output of something more than 23 million gallons, must, as Alderman Lawley Parker, the Chairman of the Water Committee, told the Council, have caused the Water Department much anxiety. Stringent measures, to which we referred at the time, had to be taken in order to "curtail the con-"sumption"—in other words, to check reckless and extravagant use of water; and the Committee had to resort to prohibition of the use of the garden hose, just as the Directors of the East London Water Company did, but probably without incurring the abuse which was poured upon the latter. It was only in this way that they managed to keep up a constant supply. As they are naturally not desirous of being placed in a similar dilemma, they are now considering means for procuring additional temporary supplies; and therefore they have wisely decided to retain certain works for which they had received an offer from the South Staffordshire Water Company, and utilize those which will yield a satisfactory quantity of water without the necessity for repumping. This is a matter of expediency, and it will also be one of economy; for the Committee hope in this way to be able to postpone for some years the provision of a third pipe on the Elan aqueduct. The works in question will yield 12½ million gallons a day, or nearly equal to the quantity which would be brought into Birmingham by the third pipe; and if the laying of this can be put off for about twenty years, it is estimated that a saving of something like £100,000 will be effected on the annual charge spread over the period. This, of course, must be a highly important consideration. While the long continuity of dry weather last summer caused the Committee a great deal of anxiety, they were in a measure compensated by the knowledge that it would allow of the Elan Valley works being pushed on with increased vigour; and therefore they were in a position to report to the Council last Tuesday that good progress had been made on the work at all points. A contract (the fifteenth) for a covered reservoir and other works, to the amount of £142,169, has been entered into with Messrs. John Aird and Sons, who, there is little doubt, will carry it out within the two years allowed for its execution.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1443.)

BUSINESS on the Stock Exchange last week was considerably reduced, almost blocked by the Money Market stopping the way. Rates for discount got harder and harder; and people were already beginning to talk of the chances of a further rise in the Bank rate to 7 per cent. The position had naturally a most depressing effect on the prices of all classes of securities. With such a state of uncertainty before them, jobbers in many cases would rather not make a price at all, and, directly anything was pressed for sale, down it went. Thus, wherever business was done, prices were lower; and many quotations which appear to remain steady were left alone simply because there was nothing doing in them, and there was no occasion to change. The Board of Trade returns, however, were cheering—showing there is a good sound bottom to the unsatisfactory artificial superstructure. In the Gas Market there was a great deal more activity than has ruled for the past few weeks, possibly owing to pressure of circumstances compelling realizations, for it was not exactly the time that one would deliberately elect to sell. Transactions were a good deal restricted to a few issues; the Metropolitan Companies having very far the largest proportion of all the business done. Changes in quotation are naturally all lower; but they are few in number, and comparatively slight in degree, and might well have been worse in such a tight time. In Gas-light issues, the ordinary was pretty extensively dealt in; and it kept up fairly well until Friday, when it fell back a point. The lowest figure touched was 103¾; but the closing mark was better. The secured issues were remarkably steady, unharmed by the money squeeze. South Metropolitan opened well, and marked 137½; but it very soon fell away, and went from bad to worse—the closing price being only 134½. Commercials were very quiet, and unchanged. Not a single transaction was marked in any of the Suburban and Provincial undertakings; but Alliance had a little fall. In the Continental group, Imperial and Union kept up very well; but European had to come down. None of the rest were affected, except Melbourne; the 4½ per cent. bonds receding a point. In the Water Companies, business was quiet enough. They were affected in the same way as other stocks, and anything offered had to put up with a reduction. This acted on Kent, Lambeth, Southwark, and West Middlesex.

The daily operations were: Gas was fairly brisk and steady on Monday; but Melbourne 4½ per cent. fell 1. Tuesday was quiet and unchanged. Wednesday was more active, but began to show signs of weakness. South Metropolitan receded 1. This condition of things continued through Thursday; and South Metropolitan fell ½ more. Both Europeans relapsed ½. On Friday there was considerable dealing in Gaslights; the ordinary falling 1. Alliance new dropped ½. In Water, Kent new fell 5½, Lambeth 3, Southwark and West Middlesex 1 each. Saturday was quieter, and without further change.

ELECTRIC LIGHTING MEMORANDA.

Effects of an "Anti-Cyclone" over London—The Electric Lighting Companies' Trouble—An Incurable Weakness—The Instance of Copenhagen and its Moral.

THE London electricity supply undertakings have learnt to dread the awkward term of meteorological science "anti-cyclone," as well as to hate it with a bitter hatred beyond the power of ordinary language to express. For several days last week, the atmospheric condition indicated by this term prevailed over these latitudes; and the resultant weather was too vile for words. It was foggy, rainy, dark, muggy, dank, and dirty to a degree that needed to be felt to be fully realized. The street pavements exuded mud, as is their manner at such times; and the multitudinous horses' hoofs spattered the black compost over everybody and everything up to the first story of the frontage buildings. It is a curious circumstance that the motor carriages, which bulk so largely in certain *pseudo*-technical periodicals, never show under these conditions, when their superior cleanliness ought to be most conspicuously advantageous. Another thing that one sees very little of at such times is the electric light. Here and there a twinkling arc light on a private service may exhibit its ineffectual fire by silvering a cubic yard or two of mist; but for all the good they are under these conditions, arc lamps might as well be left unlit and their current husbanded for private indoor lights, usually rendering themselves just visible as so many imitations of recently blown-out wooden matches.

The London Electric Lighting Companies have indeed had a rough time of it lately; so much so that the "Engineer" last week kindly undertook their defence against the complaints of their justly-incensed customers. This defence amounts to a confession that the Companies have had to learn their business as they went along, by the painful old method of "trial and error." Those who set themselves to cultivate the new lighting industry began before they were ready. Customers were raked in on all sides. The lecture platform, the press—we had almost said the pulpit also—touted for the electricians; and the chairmen of companies pointed complacently to ever-rising totals of lamp connections. Increases of 30 or 40 per cent. per annum were regarded as quite normal. All this time, those natural forces which know no mercy for weakness were waiting to prove, as many times as might be necessary, the old truism about a chain being no stronger than its weakest link. There began to be some uneasiness in regard to the permissible ratio of lamp connections to works capacity. Business reasons impelled the addition of an excess of lamps to power, because there is almost always a margin not in use at any single moment. Upon the top of this come days and nights of strain and stress, when everybody wants all the light he can get, and the "peak of the load" soars above the capacity of the generating plant.

The "Engineer" preaches patience to the customers of the electric light companies who have had to suffer deprivation of their wonted light because the companies have taken on more lamp connections than they can serve, or because the boilers and plant at the station are of too "experimental" a character to stand the strain, or because the transformers get burnt up, and so forth. This is all very nice and soothing; but it is also beside the mark. What the intending user of electric light, who does not fancy being left in the dark whenever he most needs comfortable lighting, and plenty of it, really wants is a better assurance that he will get the light of his choice, and for which he is prepared to pay—thereby performing his part of the contract. It cannot fail to be noticed that the point upon which the prospects of the electric lighting undertakings now turn is not the question of the cost, but only of reliability of the service. As we have all along admitted, there is a section of the public to whom the cost of electric lighting is no object. But there is nobody to whom the risk of being left in darkness through no fault of his own is anything but an intolerable nuisance, and a grave objection to any system from which it is inseparable.

An interesting illustration of the growing impatience of the public with the apparently incurable unreliability of all electric lighting services, is furnished by a report, with comments, published in last Friday's "Daily News" concerning the case of Copenhagen. It was stated that the city had been "plunged in darkness by a fire which fused some of the electric wires of the main supply." This intelligence suggests the question "whether the electric light ought not always to have some other light in reserve, considering its peculiar liability to sudden and widespread disaster." The commentary goes on to admit that "it has that at present, in most of our great cities, by the mere survival of gas as an illuminant, and as a source of heat and motive power. But this is due merely to the accident that the gas-fittings remain in many of the older houses in which the new light has superseded them. The newer houses, however, will have the electric light, and nothing but the electric light; and what will occur if anything serious happens to that? It will hardly bear thinking about; so, perhaps, the only thing left is to take care that nothing does happen on the colossal scale." The cheerful optimism of the concluding sentence is amusing. Is it not to be supposed that during the twenty-one years or so of its existence as an industry, electric lighting would have grown out of its weakness, if this had been merely an infantile affection? The truth of the matter is that with every breakdown of the system, more customers come to see that unreliability is an ineradicable drawback of the electric light supplied from a central station. From keeping gas in instant readiness as a stand-by, to reverting to its use altogether is only a step; and it is one that an increasing number of whilom patrons of electricity are taking every day—attracted, moreover, by the advances made by gas as an illuminant during the years they have been looking elsewhere, and which now compare favourably with the absolute stagnation of the electric light for the same period, both as regards the efficiency of the lamps and the insecurity of the supply of current.

THE INCANDESCENT ELECTRIC LAMP.

OCCASIONALLY, as opportunity serves, some passing observations on the incandescent electric lamp appear in our "Electric Lighting Memoranda;" but it is a long time since the actual state of things in regard to the manufacture and use of this kind of illuminant was discussed in these columns with anything like the fulness that the importance of the subject deserves. Of late, a whole batch of printed statements relating to the incandescent electric lamp have come before us; and we now propose to deal with them all together. The publications in question comprise a new edition, brought up to date, of Dr. J. A. Fleming's Royal Institution lectures of 1894 on "Electric Lamps and Electric Lighting" (the "Electrician" Printing and Publishing Company); articles in the "Engineer," on "Incandescent Lamp and Transformer Construction in America," by Mr. Henry E. P. Cottrell; and several recent articles and letters in electrical journals.

Beginning with Dr. Fleming's book, the first reflection that occurs to one, upon the announcement that it is in the main a reprint of lectures delivered some time during the year 1894, is that the matter must be rather stale by this time, if electric lighting is the progressive business it is popularly supposed to be. Of course, the great bulk of the principles of electric lighting are immutable; and Dr. Fleming expounded them as well in 1894 as he could do it to-day. Where a set of lectures is apt to show age is in descriptions and comments on working embodiments

of these principles. So far as the user of the electric light for practical purposes knows it, the interest of the whole thing is concentrated upon the common or domestic incandescent lamp. The first indication that Dr. Fleming's treatment of the lamp is old—at any rate, to start with—is the circumstance that on p. 68, where he speaks of the marked voltage of lamps, he does not mention any higher voltage than 100. For many subsequent pages, he is still explaining and discussing what goes on when a 16-candle lamp marked for 100 volts is supplied by a public company with electricity at this pressure. In a sense, therefore, all this is out of date; and every conclusion drawn from data so limited—including the author's elaborate examination of the question of the comparative cost of electric and gas light—is now obsolete.

The recent alteration of the voltage of current at the consumers' terminals, calls for a radical reconsideration of the whole subject of the lamp and its duty, with particular reference to the effects of the pressure. Dr. Fleming does not attempt such an investigation. He devotes a large amount of space to discussing the "Edison effect," in which, we make bold to say, customers of electricity supply stations are not interested. He neglects to inform us why electricity should be distributed at any conventional voltage. He mentions in one place 100-volt, 50-volt, and 10-volt lamps; but he does not state why a public supply is not regulated, say, to the pressure (whatever it may be) at which a carbon filament lamp will yield the most light for the money. It is summarily stated that "there are strong arguments in favour of the use of electric pressures as high or higher than 200 volts in domestic and private electric lighting, when conducted from public electric supply stations." What is this advantage?

The untechnical reader might conclude that the demand for higher voltage did not originate with the makers or users of lamps. We are not told, and never have been told, what voltage would really suit the type of lamp best. It may be that a user of electric light generating his own power and providing himself with lamps, would find it to his advantage to work the whole affair at 10 volts pressure. This is a question which we cannot profess to answer. It is understood that Edison's first incandescent lamps were made for 50 volts; and it was not a very costly matter to wire a house for electric lighting at this pressure. But when it came to central station work, economical considerations pointed to 100 volts or thereabouts as the lowest pressure at which the current could be sent out. There was no regard to the feelings or wishes of the lamp makers or users, on the part of those who made this alteration. The lamps simply had to be adapted to the higher pressure. This was eventually done, with passable success—more especially in the case of the 16-candle lamps which were from the first the standard Edison size for America. In England, the costliness of electric lighting induced those who wished to introduce it by degrees to favour an 8-candle power lamp, which they asserted to be quite as good a light as the ordinary gas-flame of the period. This size of lamp is still the standard to which electric lights are reduced for the purpose of enumeration. Even at 100 volts pressure, however, as Dr. Fleming shows, to make durable and efficient lamps giving 8 or 5 candle power became troublesome, owing to the high resistance required of the filament. The 8-candle power lamp requires a filament of double the resistance, and the 5-candle power lamp of three times the resistance, of the filament of a 16-candle lamp, at the same voltage. This increased resistance is obtainable in two ways—by thinning the filament, or by lengthening it. Obviously, there is a speedy limit to the former alternative, as the thinner the filament the more fragile it is. Recourse must therefore be had to increasing the length of the filament; and when it is a question of raising the voltage from 100 to 200, all these differences of resisting value for lamps of various sizes are multiplied fourfold.

It consequently becomes a grave question how a carbon filament can be got to stand the strain for any reasonable time. "Accordingly, the construction of a high-voltage carbon filament lamp of normal candle power, and contained in a bulb of the usual size, depends very much upon contrivances for getting the requisite length of carbon filament into the bulb. Since primary or untreated carbon has a higher specific resistance than treated carbon, some makers advocate the use of an untreated carbon for use (*sic*) in high-voltage lamps. It is, however, recognized that the softer carbon disintegrates or volatilizes faster than the treated carbon; hence, an untreated filament generally deteriorates faster than a treated filament." This is one sort of "progress" in electric lighting!

If a well-treated—*i.e.*, sufficiently "flashed"—filament is used in making a 16-candle power lamp, to be worked at 230 volts, about 14 inches of carbon filament has to be got somehow into the bulb. Lamp makers achieve this in various ways. Sometimes they simply place two double-loop filaments side by side, but connected in series in one bulb. In other cases, they crinkle or corrugate the single-length filament. In order to prevent sagging of the long filament, or the touching by the carbon either of the glass or of its own turns, various expedients of stays and hangings are required. In this way, high-voltage lamps are now made for 5, 8, 16 candle power and upwards, up to 250 volts. "In the low candle-power high-voltage lamps, it is, however, necessary to make the filament so thin that it has not a very satisfactory life unless used with a perfectly constant service pressure."

It has already been stated that, in order to meet the demand for a high-voltage lamp, many makers have fallen back upon the "untreated" filament, for the sake of its high resistance. This make of filament has the drawback of deteriorating rapidly; even 16-candle power lamps so made losing 42 per cent. in candle power and 35 per cent. efficiency in the course of 600 hours' use. (Fleming, p. 134.) According to this testimony, it would appear that modern "improvement" of the incandescent electric lamp since 1894 should bear the minus sign. Such lamps as are actually on the market represent merely the endeavour of the trade to meet the requirements of central station working at high pressure, and have nothing to show as regards greater saving of current, higher illuminating effect for current consumed, longer life, or any other benefit in the direct interest of the user. There is the Nernst lamp; but Dr. Fleming dismisses this appliance as wanting evidence of durability. Welsbach has been endeavouring to do something with thoria; Langhans has tried carbide of silicon; and Maxim has prepared a very dense and adamantine form of carbon. Innumerable patents have been taken out "for incorporating with, or depositing on, the carbon filament some substance more refractory than carbon and less volatile at high temperatures." They have not had any practical issue. The carbon filament lamp holds the field; but Dr. Fleming's evidence goes to prove that where a public electricity supply undertaking proposes to change the voltage at the consumers' terminals from 100 to 200 volts and upwards, it should only be permitted subject to the obligation to supply lamps *gratis*.

The truth is that the development of commercial electricity supply has been away from the incandescent lamp, which remains the unsatisfactory appliance it ever was. So says Mr. Cottrell, after surveying the lapse of time since its introduction, and the enormous trade to which it has grown. He admits that comparatively very few of these lamps attain a standard of even moderate efficiency. They fall off in illuminating power so quickly and heavily; "and the falling off in the light is not accompanied by a falling off in the quarterly bill." There is very little difference between the outward appearance or materials of construction of lamps in the market. The better makes resist longer the process of disintegration of the filament and blackening of the bulb, and have generally a longer effective life. Mr. Cottrell gives the useful hint that the cooler the bulb in use, the better the lamp. The temperature of the glass is really an absolute guide to the degree of the internal vacuum and the illuminating power. "In a first-class lamp, the bulb can be touched by the hand and removed from the holders without burning or inconvenience after any length of lighting." The quality of the glass used in making the bulbs has also a great deal to do with the useful lighting effect of the lamp. The best glass stops 10 per cent. of the illuminating power; while an inferior glass, although perfectly plain and colourless, will stop double this amount.

Then as to the durability of lamp filaments, Mr. Cottrell testifies that the higher the voltage the less time it will take to wear them out. The most perfect possible regulation of the pressure to the rated maximum is also imperative. Naturally, the higher the rate the more important it is that it should be kept uniform. A variation of 6 per cent. in excess will increase the number of lamp breakages $3\frac{1}{2}$ times. Mr. Cottrell confirms the suspicion that the modern high-voltage lamp is a worse lamp for the consumer than its precursor. He says: "The wattage of small high-voltage lamps per candle is not so low as that of lamps of lower voltages; and their specific efficiency is not so good. Whereas a 16-candle 110-volt lamp will consume about 3·1 watts per candle, a similar lamp for 220 volts will consume 3·8 watts per candle power, the specific efficiency of the first being 0·323, and of the second only 0·263; and the length of life is also proportionately shorter." It will be noticed that with Mr. Cottrell a 16-candle power lamp is a "small" lamp. What would he say about an 8 or 5 candle power lamp of high voltage?

The "Electrician," while reporting that the general movement in the direction of high-pressure electricity distribution has had the effect of improving the quality of the high-voltage lamps in the market, evidently means the words to be understood in the relative sense, and with reference to the correction of defects proceeding from the length of the filament, and so forth. As regards efficiency, it is conceded that about 4 watts per candle power for a 16-candle power lamp is as much as can be expected of this grade of lamp. The smaller sizes of lamps run to more current per candle; but the extreme minuteness of the luminous member in these appliances sometimes leads to irregular results. Another "wrinkle" of the incandescent lamp trade refers to the method of testing for illuminating power. Electricians have lately displayed a marked partiality for the Hefner amyl-acetate standard of light. This may or may not be because a 16-candle incandescent lamp, rated by the Hefner standard, will only show 14 candles on the English standard. A lamp declared to take 3·5 watts per candle (Hefner standard) will need nearly 4 watts per English standard candle. In so many ways does the artless electrician find it possible to take the chill off the stern aspect of Science!

The President of the Local Government Board has appointed Mr. CHARLES PERRIN, M.Inst.C.E., Official Water Examiner under the Metropolis Water Act, 1871, in succession to the late General Scott.

MR. RICKMAN ON INDUSTRIAL APPRENTICESHIP.

In discussing last week one of the salient points of Mr. T. M. Rickman's address as President of the Surveyors' Institute, we mentioned the fact that the author dealt with other important topics besides the question of the usual method of valuing property for compulsory purchase. Mr. Rickman is, as he says, a Quantity Surveyor—that is, he represents an order of professional men to whom both designers and constructors of engineering and building works are under the greatest and most particular obligations. They stand between the draughtsman and specification writer and the business man who has to translate steel and cement, or bricks and mortar, into terms of hard cash. The need for such a go-between has become more imperative with the modern change in the method of doing works of construction. In the old days, as Mr. Rickman remarks, a builder was a man who had nothing in the nature of organized resources at his command. When he had to erect an important building, he had to collect his artificers from far and wide, and probably to fulfil his instructions as best he could, with the materials and means readiest to his hand. Quantity surveyors were not much in request under these conditions. The builder knew his work, and did not need to be told everything. The results were characteristic. The man's work was himself; and it was called after him.

All this is changed. Modern exigencies have produced the general contractor, with his costly staff and machinery, his select providers of materials, and his organized retinue of artisans and labourers. He undertakes the work without enthusiasm, in an atmosphere of penalties, and passes away when it is completed to another job, without leaving a trace of his identity behind him. And, it might be added, the designer and the client are usually glad enough to see the last of him. Mr. Rickman concedes that this may be business, but denies that it is favourable to the development of structural work except on the lines of a brutal utilitarianism. Long, long ago, when there were Trade Guilds, alongside of the main protective function of these bodies there existed the not inconsiderable one of the perfecting of the craft. It is a deep question whether the actual condition of things preserves the improving and ennobling influence of the old Guild, such as it was, to say nothing of advancing upon it. As the employer is no longer necessarily also a master of the craft—he may be merely a joint-stock company, or the receiver for a debenture corporation—so likewise the artisan is different from his predecessors. It is acutely pointed out by Mr. Rickman that all the currents in the stream of skilled labour flowing through the land are first felt in London and the largest towns. London is sucking the country dry of skilled workmen; and where, he asks, is the future supply likely to come from?

It is impossible to exaggerate the seriousness of this state of things. We referred to one phase of it in the "Journal" for July 4 last, and are glad of Mr. Rickman's help in further ventilating the subject. He repeats the assertion that the big Metropolitan workshops are unduly denuded of apprentices and learners; small country shops being now the only places where handicrafts can be thoroughly learnt in the sound old-fashioned way. The London County Council have found this out. The report of the Special Sub-Committee of the Technical Education Board of the County Council states that "forty-one typical London firms engaged in various branches of the building trade, having among them 12,000 employees, have only 80 apprentices and 143 so-called 'learners,' instead of 1600, which would be about the normal proportion." Employers and men agree that this is an unnatural and improper condition of things; but one party throws the blame for it upon the other. The men assert that the fault lies with the masters, who, they allege, refuse to be troubled with apprentices in their crowded shops, where the most effective use has to be made of every inch of bench room. The masters retaliate that the men intentionally restrict the number of apprentices, with the view of limiting the output and creating an organized monopoly in the selfish interest of the present generation of tradesmen.

Mr. Rickman examines both contentions. The impeachment of the employers he admits to be part proved—at any rate, as against the general contractors, or purely capitalist employers. He acknowledges that the tendency of the times is towards the absorption, or extinction, of the masters in separate trades, and the aggregation of work in the hands of the capitalist employer, who finds it to his interest to substitute mechanical for hand processes in every possible way. And as it is entirely a question of the employment of capital, the general contractor has no inducement to look beyond the immediate state of the labour market. So long as he can get such skilled labour as he requires, it matters not to the general contractor where the skill has been acquired; and Mr. Rickman admits that "he does not feel under any obligation to encumber his shops with raw lads, who are troublesome to manage, and add nothing to his profits." This is the case against the general building contractor, who, as often as not, is merely being "financed" by somebody. There will always be such employers; but it is possible to note, with Mr. Rickman, the beginnings of a change of the fashion.

The allegation against the men is discussed by Mr. Rickman with an open mind, and in a generous spirit. Supposing it to be true that there is among tradesmen a jealousy against apprentices, he points out that such a feeling is not confined to the trades. He makes bold to say that it exists equally in the professions, where it operates "by a rise in the amount of premiums to be paid, an increase in the difficulty of the examination to be passed, or in greater stringency as regards the conditions of admission." This is hardly fair. The truth probably is that premiums nowadays asked with pupils are lower, rather than higher, than was usual in the Pecksniffian era. And if examinations and other obstacles to the overrunning of professions by unsuitable aspirants grow steeper, is not this tendency explicable on grounds other than trade jealousy? Successful professional men are always in want of competent assistants; and they know that the best way of supplying their needs is to train their own staff. The case of the skilled carpenter or fitter is not quite the same.

The practical point, however, is how far the tradesman's jealousy of apprentices can be carried without injury to the handicraft itself. In certain trades, mischief has already been done. The public must be served, and will not stand aside or suffer its interests to be postponed to those of the hand worker. This is what the latter can never bring himself to understand, especially when several "organized" tradesmen get together for the purpose of regulating the universe through the intermediary of their Branch Secretary. The tradesman may carry his point; but one result is to stimulate invention, and encourage new mechanical processes. "For example, the carpenter and joiner is fast becoming a mere fitter and fixer; while the plasterers, whose economic sins have, perhaps, been the greatest, have called into being the Nemesis of fibrous plaster and other 'decorative' appliances, and have set the architects on an eager quest for some substitute for the present clothing of our walls and ceilings." The immediate result is that the standard of joiners' and plasterers' work is deteriorating. Beautiful work can still be had by those who are willing to pay for, and know where to go for it; but it is becoming the exception. The great middle class of the community, who after all constitute the vast majority of employers, must fall in with the American condition, and buy stock shop patterns, or go without.

It scarcely needs arguing that, if the organized trades object to learners and apprentices in the shops under their domination, they are scarcely likely to look with favour on the technical education boards, manual instruction classes, and what not in the way of teaching agencies maintained out of the public funds, which actually pretend to fill the gap. These classes are all very well in their way; but this way is not to a recruiting ground for the skilled labour market. So long as the different sections of working class opinion immediately concerned agree in restricting the numbers of tradesmen, all this subsidized endeavour is simply an attempt to do at one end what the Trade Unions are as assiduously undoing at the other; and the outcome will be a futility. The remedy must come, if it comes at all, by agreement of the masters and men upon measures necessary for the manning of the trades for the future.

Here, unhappily, the inquiry stumbles over another obstacle—the tendency of lads brought up under the Board Schools to seek clerical rather than industrial employment. It has been asserted, and not denied, that "a large proportion of the sons of London artisans become clerks in City offices." The cream of the schools is probably skimmed first, and reserved for the teaching "profession." In the "Journal" for the 28th ult., an essay on "The Fear of Over-Educating the Working Classes" set forth a Nineteenth Century reviewer's views of the matter. It is emphasized in this article, and we now repeat, that the real question at issue is as to the nature and quality of that elementary education which costs the British rate and tax-payer so much. No reasonable man is afraid of over-education, where the training is wise and well directed. What is being asked, however—and with increasing insistence—is whether a system of schooling which chiefly results in turning out shoals of bad clerks and little else, is either wise or well-directed.

Mr. Rickman notices, and rightly values highly, the testimony of some conductors of technical classes that a large proportion of those attending these classes are clerks and unskilled men, who are thus striving to find an entrance into the ranks of skilled labour. But the Trade Unions seek to bar this, by ruling that no man must work at a trade unless he has been brought up to it. Nothing could be a more bitter reflection on the pen-and-ink character of Board School instruction than this attempt of ill-paid, because redundant, clerks to recover the chance of earning an ample livelihood as artisans after their first opportunity of doing so had been missed. Missed it will continue to be, however, so long as the Board School boy is encouraged to regard a Teachership as the highest reward of intellect and character, and a Clerkship as a consolation prize. How restore the robust belief that the Bricklayer is more to be envied than the Bookkeeper—that the Carpenter earns more than the Clerk; and the Plumber is quite as well paid as the Preacher? Who is more likely to "get on" in the world—the man who can work with his hands as well as his head, or the poor anæmic product of too much school, who can only cast up a column of figures, not without mistakes, or write a letter with only a little shakiness of grammar? Time was when the occupation of clerk was one of the learned professions. At the same time, masons were not required to pass the Sixth Standard. But they built York Minsters, Westminster Abbeys; and even the village handicraftsman could erect manorial halls which are the despair of modern artisans even to copy. When will our educational

system once more concern itself with the substance, and cease contemplating the *simulacrum* of adequate, wise, and helpful mental training? The whole thing has received a deplorable twist; and it does not seem quite the proper way of taking it "out of winding" that disappointed clerks should be learning gas-fitting at evening classes, while the clever sons of gas-fitters are reading up for competitive examinations for clerkships. Meanwhile, we revert to our suggestion of July 4: It is better to do a little in this way than nothing at all.

THE NEED FOR REFORM IN COMPANY LAW.

THE Lord Mayor has wasted no time redeeming the promise—made on his behalf by the Recorder of the City, on the occasion of the Lord Mayor's visit to the Law Courts on the 9th ult.—that he would take any steps he might be advised to take to clear himself of the charges that had been brought against him in connection with the promotion and direction of certain Joint-Stock Companies. We can well understand that his anxiety to so clear himself was not diminished by the terms in which the Lord Chief Justice referred to the subject in replying to the Recorder's speech.

The enterprise the affairs of which were specifically referred to by Lord Russell as requiring further investigation and explanation by its Directors (of whom the Lord Mayor was one) was the Industrial Contract Corporation. A petition for the winding-up of this concern had been withdrawn, in consequence of the Directors arranging terms with the petitioning party; but the Judge before whom the petition had come did not permit its withdrawal to pass without remarking that the history of the Corporation, as revealed in the papers before him, was such that he felt disposed to lay those papers before the Public Prosecutor. At as early a date as possible after his visit to the Law Courts, the Lord Mayor caused application to be made for permission to restore the winding-up petition. The request was granted; and the Directors of the Corporation—including Mr. Newton, the Lord Mayor—have since been examined in the High Court by Mr. Justice Wright, in order that the Official Receiver in Bankruptcy may decide, upon consideration of the testimony so sworn, whether he shall take any further steps. It will, of course, also lie in the power of any shareholder who may deem himself aggrieved by the conduct of the Directors, to take independent action.

The conduct of the Promoters and Directors of the Corporation is, therefore, not a subject for present discussion; and Mr. Justice Wright, in the address with which he closed the proceedings last week, properly declined to express even a provisional opinion thereon. But it is only right to place on record the fact that the Lord Mayor has fully redeemed his promise to court inquiry; and the facts brought out by the examination may be stated, in short, as follows: In 1897, the Industrial Contracts Syndicate, with a capital of £1000 (which was in effect owned by a Mr. William Mendel), purchased the business of Messrs. Grice, provision dealers, for nearly £17,000, and renamed the business the "Auxiliary Stores, Limited." The concern known as the Auxiliary Stores, Limited, of which the Lord Mayor and Mr. Mendel were Directors, was then sold to the Industrial Contract Corporation (of which the Lord Mayor was also a Director, and of which the Syndicate held the founders' shares) for £48,000. The profit on this transaction (less the cost of floating the Corporation, to which the public subscribed £168,000) was divided between the Directors and Mr. Mendel. The fact that the Grice business had been recently bought for very much less than the Corporation were paying for it, and that a good share of the difference was going into the pockets of the Directors, was not, however, mentioned in the prospectus laid before the public. When it is added that the Articles of Association, upon the terms of which Mr. Justice Wright commented with asperity, contained provisions which gave the promoters who held the founders' shares voting power equal to that of all the other shareholders, together with most inequitable rights to profits in the event of winding-up, and that the Judge declared that, however morally reprehensible, those articles were probably legal, it will be agreed that the case of the Industrial Contract Corporation affords a striking example of the need for Company Law Reform, and that the Lord Chief Justice has performed a public service in calling special attention to the facts. We await the action of the Official Receiver with interest.

The desire to see an effective reform of the Company Law—a desire general to all but Company Promoters—will not be lessened by a perusal of the eighth annual report to the Board of Trade made by the Inspector-General in Companies Liquidation, which was issued on Wednesday. The number of companies wound up, either compulsorily or voluntarily, during 1898 was 1745, as compared with 1587 the previous year, and 1262 in 1896. The capital involved in these liquidations was: In 1896, £46,494,446; in 1897, £53,547,678; in 1898, £66,702,858. There can be little or no doubt that, had the Company Law been of a more satisfactory character during those years, many of these companies could never have been floated, and the public would not have lost so much of their capital. That is clearly to be seen from the concluding sentences of the report:

> A large number of these companies had practically no capital; the object being to trade on credit, partly by means of the issue of debentures and partly by incurring trade debts. The businesses were, in many cases of a petty character, carried on with difficulty; the traders just managing to exist by strict economy in keeping down expenses, gradually running up debts until it was impossible to obtain further credit, and with liquidation always looming on the horizon. There were also numerous cases in which the business was obviously insolvent at the time of the company's formation; the main object being apparently to escape the penalties of bankruptcy. The *modus operandi* in these cases, although varying in detail, is of a somewhat uniform general character. But, having regard to the experience of the past few years, I am led to the conclusion that, while the magnitude of the cases in which this device is practised has considerably diminished, the number has increased, and the character of the transactions has deteriorated.

We are glad to see that Company Law Reform is being given a prominent position in the—doubtless premature—forecasts of the Government's programme for next session; though it is a recognized fact that the Law will have to get up very early in the morning to prevent the people with brains and no money making a living out of those with money and no brains.

PERSONAL.

Mr. HAROLD DAVIES, who for the past sixteen months has been Assistant at the Colne (Lancs.) Gas-Works has—out of a large number of applications—been selected to fill the post of Assistant Engineer and Manager of the Blackburn Gas-Works, under Mr. S. R. Ogden.

At the meeting of the Institution of Civil Engineers last Tuesday, Mr. E. W. DIXON, Water-Works Engineer to the Harrogate Corporation, and Mr. A. M. PADDON (of Messrs. Humphreys and Glasgow) were transferred from the class of associate members to that of members.

Mr. J. A. BELLAMY, who for the past few years has been Deputy-Chairman of the Plymouth and Stonehouse Gas Company, has become Chairman, in succession to Mr. George Henderson, whose retirement is noticed below; Mr. J. WILLS taking the position vacated by Mr. Bellamy.

The Gas Committee of the Walsall Corporation have recommended that Mr. W. GORSE, the Assistant Gas Engineer, be appointed Gas Engineer and Manager from the 1st prox., in succession to Mr. John Tindall, who, as already mentioned in the "JOURNAL," has relinquished the position.

Sir EDWARD LAWRENCE, Chairman of the Liverpool United Gas Company, has decided, owing to advancing years, to retire from the chairmanship of the Executive Committee of the Constitutional Association of Liverpool, but has expressed his continued adhesion to the Conservative party in all its aims.

Mr. GEORGE HEMINGWAY, who has been employed by the Longwood Gas Company during the past six years, has been appointed, out of more than seventy applicants, Gas Manager to the Urban District Council of Driffield, in succession to Mr. Langton. Prior to going to Longwood, Mr. Hemingway was engaged at the gas-works owned by the Earl of Yarborough, at Brocklesby, in Lincolnshire. He entered upon his duties at Driffield yesterday.

We congratulate Mr. SIDNEY O. STEPHENSON, of Ramsgate, upon his appointment to the Assistant Managership of the West Bromwich Corporation Gas-Works—a position for which applications were invited in the "JOURNAL" for the 21st ult. Mr. Stephenson (who is a son of Mr. Andrew Stephenson) has had a varied experience. He received his training first at the Norwich station of the British Gaslight Company, and then with Brin's Oxygen Company. He was afterwards Senior Draughtsman and Assistant to Mr. W. North, of Stourbridge, and is at the present time one of Mr. W. A. Valon's assistants at Ramsgate. A large circle of friends will unite in wishing him every success in his new sphere of work.

Tokens of the goodwill and esteem of the staff and employees at the Neepsend gas-works of the Sheffield Gas Company will be carried away by the Superintendent, Mr. ALEXANDER ALLAN, and his wife. The gifts, which consist of a cabinet case of cutlery and a silver tea and coffee service, were presented to Mr. Allan at a social gathering which took place yesterday week. Mr. J. W. Morrison, the Chief Engineer of the Gas Company, presided, and, after referring to the efficient manner in which Mr. Allan had discharged his duties, expressed his regret, which he knew was shared by the Directors, at the severance of Mr. Allan's connection with the Company, consequent on his appointment as Gas and Electrical Engineer to the Nelson Corporation. The presentation was made by the oldest workman in the service (Mr. Smith), who spoke of the good feeling which had always existed between the Superintendent and the men, and the interest which both Mr. and Mrs. Allan had taken in their welfare.

Last Thursday, amid many demonstrations of sympathy and regret, the remains of the late Mr. JOHN THOMAS, Secretary of the Plymouth and Stonehouse Gas Company, who, as recorded last week, died on the 2nd inst., were laid to rest in Plymouth Cemetery. The first part of the funeral ceremony was performed at Ebenezer Wesleyan Chapel, of which deceased was for many years a leading member; and the body of the building was well filled with mourners and representatives of the religious and other bodies with which Mr. Thomas was identified. The Rev. J. Cuthbertson delivered an address in which he spoke highly of the personal qualities of their departed friend, whose

chief characteristics were, he said, very high integrity and a keen sense of personal honour. The reverend gentleman conducted the concluding portion of the service at the grave. The body was borne by eight members of the clerical staff of the Company, who were represented by the Chairman and Deputy-Chairman (Messrs. Bellamy and Wills), the Directors, the Acting Secretary (Mr. H. B. Heath), the Manager (Mr. A. Wharton), the Engineer (Mr. P. S. Hoyte), and other officials. A large number of personal and professional friends were present.

At a meeting of the Directors of the Stonehaven Gas Company held last Tuesday, Mr. WILLIAM M'LEAN ROSS was unanimously appointed Manager and Collector, in succession to his deceased father, Mr. Graham Ross. The new Gas Manager, though only 23 years of age, has had considerable experience in the construction and management of gas-works. He served his apprenticeship with Messrs. R. Laidlaw and Sons and the Barrowfield Iron-Works—two Glasgow firms well known for their manufacture of gas and water works plant. In August, 1897, he returned to Stonehaven as assistant to his father; and since then he has taken a considerable share in the management of the works, which during late years have developed very much, owing to the large increase of the town. Mr. Ross is the holder of a City and Guilds of London Certificate in "Gas Manufacture," and several from South Kensington in machine construction, &c. The appointment is a very popular one; and it may be predicted that the new Manager will worthily uphold the reputation of a long line of gas managers with which his name is connected. At the same meeting, the Directors unanimously resolved to record in the minutes an expression of their deep regret at the loss sustained by the Company by the death of their late Manager, and also to convey to Mrs. Ross and the family their sympathy in their sad bereavement.

It was our painful duty to record last week the death of Mr. J. Thomas, the Secretary of the Plymouth and Stonehouse Gas Company. We now learn that Mr. GEORGE HENDERSON, who was one of the founders of the Company fifty-five years ago, and for about twenty years has been Chairman, has relinquished his position. The history of the Plymouth Gas Company, during the long period of Mr. Henderson's connection with it, has been a remarkable one. It was started in rivalry to the United Gas Company, which was then supplying gas in Plymouth, but charging very high rates, ranging from 9s. to 15s. per 1000 cubic feet. Mr. Henderson personally canvassed for subscribers and customers for the new Company, and for more than thirty years was Secretary. On resigning this position in 1878, he was made a Director, and shortly afterwards became Chairman. Of late years, age and infirmity have sapped his energy; but he deserves to be kindly remembered by the gas consumers of Plymouth, for it is due in no small degree to his work and influence that the town was for many years supplied with the cheapest gas in England. In 1887, the Directors and officers of the Company presented him with his portrait, which is now hanging in the Board-room. By Mr. Henderson's retirement and the death of Mr. Thomas, there has been a distinct severance between the old and the new administration of the Company.

OBITUARY.

DAVID BRUCE PEEBLES.

Our readers will learn with much regret of the death of Mr. David Bruce Peebles, the senior partner of Messrs. D. Bruce Peebles and Co., of Tay Works, Bonnington, Leith, which took place at his residence at Tay House, Bonnington, last Tuesday, in his 74th year. Mr. Peebles was a native of Dundee; and after serving an apprenticeship with an engineering firm in that town, he worked for several years in the locomotive department of the Great Western Railway Company at Swindon. Subsequently he was employed for some time in locomotive works at Amiens. Returning to this country, he took temporary service in the works of Messrs. John Fairbairn and Co., of Leeds. Then he went back to Scotland, and became a partner of Messrs. Fullarton and Co., gas-meter manufacturers, of Edinburgh. In 1866 he left that firm, and commenced business as a meter manufacturer in premises at Fountainbridge, Edinburgh. These, in a few years, he found to be too small; and he acquired ground at Bonnington, in Leith, upon which he erected new works for the manufacture of meters and gas engineering plant. His name will probably be remembered more as the inventor of the needle governor gas-burner than by any of his other numerous inventions in matters relating to gas consumption. Of late years his firm have bestowed a great deal of attention to the development of the gas-engine, in which department they have shown themselves to be among the most expert of constructors. For many years Mr. Bruce Peebles regularly attended meetings of gas managers in Scotland, and at such gatherings he was noted for his breezy contributions to discussions. He was a prolific writer of papers on subjects connected with gas supply, which were read at these and other meetings. On account of his services to the gas industry, he was elected an honorary member of the North British Association of Gas Managers, of the accounts of which body he was also for many years the Auditor. Mr. Peebles was a Fellow of the Royal Society of Scotland, and a Past-President of the Royal Scottish Society of Arts. He is survived by a family of three sons and four daughters, all grown up.

NOTES.

The Propagation of Light through Matter.

"Nature" learns from the "Bulletin of the French Physical Society" that M. Sagnac has given a theory of the propagation of light through matter which supposes that the light-waves are transmitted by the same ether as *in vacuo*, without the properties of this medium being in any way altered by the presence of material particles, the only effect of which is to scatter the vibrations in the same manner as small conductors, each of which reflects and diffracts all vibrations of sufficiently great wavelength. The author shows that, without introducing any electro-magnetical or dynamical considerations, it is possible to give a purely kinematical explanation of the laws of reflection and refraction, the existence of the optic layer, and the existence of refractive indices greater than unity. M. Sagnac shows how the optic phenomena of entrainment of ether by matter can be explained by his hypothesis without the assumption of either an ether denser than the ether of a vacuum or any mechanical reaction between the ether and matter. This kinematical theory of the entrainment of the ether presents no difficulties or complications in accounting for the existence of dispersion or double refraction.

Coke as Fuel for Steam Raising.

In connection with the Everett (Boston) coke and gas supply venture, efforts are being pertinaciously made to recommend coke as a fuel to local manufacturers. At the last meeting of the New England Cotton Manufacturers' Association, a paper on the subject was read by Mr. Arthur C. Freeman, who endeavoured to show that hard coke is preferable to coal as a steam-raising fuel. He claimed for it the advantages of cleanliness, from the absence of dust and smoke, and from the small quantity of ash. Quickness of getting up full fire, ease of control, and freedom from clogging of the boiler tubes were also mentioned. The suggestions in regard to the management of coke boiler-fires were that the stoking should be light and frequent; the bed of fuel being kept to a maximum of 7 or 8 inches in thickness. The author observed that it is better to refrain from disturbing the top of a coke-fire, which should be kept as level as possible. Shaking fire-bars were recommended for furnaces burning coke; but if fixed bars are used, the clinker must be sliced off with a light poker. A water ashpit, or a jet of steam under the furnace-bars, is declared to be advisable. When all these points are attended to, the author promised that the comparative evaporating power of this fuel would work out to 89 per cent. of the best bituminous coals, and about 6 per cent. greater than the "buckwheat" size of anthracite coals which are generally used for the purpose.

Lubricating Oils.

Some hints on lubricating oils are given in a recent number of the "Engineer." They are prefaced by the remark that the characteristics of a good lubricant are not easily defined, and that few of those who have the lubrication of an engine to attend to know the nature of their work. The importance of the proper lubrication of moving machinery is sufficient to warrant adequate study of the subject. A great many conditions go to the proper selection and application of a lubricant; and it is rarely that sufficient attention is given to either. Generally speaking, it is held that American mineral oils are the best lubricants. These oils are of specific gravities ranging between ·886 and ·920, of high flash-points, and considerable viscosity. They should be completely free from water, acid, tar, or tar oil, have only a slight smell, and completely dissolve in petroleum benzine. There should be no sedimentary deposit, even after long standing. Such oil should not resinify or dry to a gummy coating on long exposure to the action of the air. Some Governments insist on the comparative transparency of the oil in thin layers, and object to too dark a colour. In Berlin, lubricating oils of two different characters, for winter and summer use, are specified. The winter oil must remain fluid at 5° C., and in no case is the addition of rape oil to mineral oils or the products of distillation thereof permitted in these parts. Other German Governments equally insist on the absence of any admixture of vegetable oils, presumably with the object of increasing the viscosity of mineral lubricating oils.

The Cost of Steam.

Mr John Holliday has expounded to the members of the Institution of Electrical Engineers the results of six years' experience of steam raising in a range of nine Lancashire boilers. These boilers were of full size, not new. Three of them were fitted with Perret's grates for burning breeze; the other six being fitted with ordinary bars, and hand-fired. The steam was all made at the uniform pressure of 60 lbs. per square inch; and every boiler was worked up to its full power. The water-feed, heated to 220° Fahr. after passing the feed-pump, was common to all the boilers. The coke breeze cost 3s. 6d. per ton, delivered in front of the boilers. It contained from 22 to 25 per cent. of incombustible matter. It was burnt at the rate of 15 tons in 24 hours, or 18 lbs. per hour per square foot of grate surface, with an average evaporating duty of 5·8 lbs. of water per pound of fuel. The quantity of water evaporated by this fuel is about 3400 lbs. per hour per boiler, equivalent to 170-horse power at 20 lbs. of steam per horse power per hour—

a low result, which is one of the things to be reckoned with among the drawbacks to the use of inferior fuels. For the six companion boilers, Welsh coal costing 14s. 6d. per ton delivered was chiefly used. This fuel had an evaporating duty of 9·5 lbs. of water per pound, and made 11·7 per cent. more steam per boiler than the breeze. To evaporate by it 1000 gallons of water, however, cost for fuel 6s. 9¾d.; while the corresponding figure for breeze was only 2s. 8¼d. There are, of course, other costs to be taken into consideration before the true comparison between any two classes of boiler fuel can be struck. Still, the breeze shows a wide margin to work upon.

Water-Meters as Waste-Preventers.

At the last meeting of the American Society of Municipal Improvements, Mr. M. R. Sherrard, of the Newark (N.J.) Water Department, who is Chairman of the Water Committee of the Society, reported the results of his endeavours to reduce the waste of water in the city. In 1898, with 10 per cent. of the services metered, the consumers by this system took 12 per cent. of the supply; the Municipality used approximately 5 per cent. of the total quantity; while that chargeable to unmetered consumers and waste amounted to 83 per cent. of the water delivered into the reservoirs. During May of this year, the compulsory introduction of meters was undertaken by the Municipality at their own expense; and a careful house-to-house inspection, accompanied by a notice to repair leaky fittings, was made. At this time all the factories and a few other places had meters; there being about 3200 meters out of a total of 32,000 taps. During May, June, July, and August, meters were set at the expense of the Water Department on 3 per cent. of the taps; selecting the wasteful consumers—principally saloons, tenement houses, and business places. The result was a lowering of the consumption nearly 15 per cent. The quantity of water consumed, in million gallons per day, for the month of July, in the years 1895, 1896, 1897, 1898, and 1899 was 21·3, 22·9, 25·1, 28·4, and 26·3 respectively; whereas for the month of August for the same years it was 22·6, 23, 24·6, 29·4, and 25·5 respectively. Mr. Sherrard thought perhaps one-fifth of this reduction could be attributed to the special inspection; but by far the greater part was due to the meters. The saving corresponded to a reduction of daily consumption from 110 to about 95 gallons per head.

Natural Coke in Texas.

Discoveries of natural coke deposits in different parts of the world are not strange to the science of geology; but hitherto this variety of carboniferous deposit has never possessed much economic value. It is now reported from America that the Southern Pacific Railroad Company's prospectors have found deposits of natural coke in considerable quantity in the Santa Clara Coal-field, which is near La Barranca—a small town 95 miles north-east of Ortiz, on the Sonora Railway. The coal-beds here occur in a series of seams with sands and clays, of the upper Triassic deposits. The first find was of a 3-feet vein of good coke, overlying 2 feet of anthracite. This was followed up by the discovery of an outcrop, on the banks of a stream, of a good body of coke, which, at a depth of 30 feet, runs 8 feet thick, and at 130 feet depth was over 10 feet thick. Several other deposits, ranging from 2 feet to 4 feet thick, have been found in the neighbourhood. The cause of the formation of the coke is not quite clear. It cannot all be due to the contact of coal with an eruptive igneous rock, because one bed of coke has no igneous rock near it; and in one place small pockets of coke occur in the midst of a 4-feet seam of anthracite. The coke is of a dark grey colour, of even texture, with small pores. It is denser than most oven coke, and is very firm. It breaks with an even fracture; but some pieces exhibit the columnar structure of the best oven-coke. It is an excellent fuel, not more difficult to ignite than the anthracite accompanying it; and it burns to a white ash. The discovery of these deposits is regarded as of commercial importance to the neighbourhood, which is otherwise deficient of natural fuel supply.

The Oechelhaeuser Gas-Engine.

Mr. Bryan Donkin, in the "Engineer," speaks well of the Oechelhaeuser gas-engine for working directly with blast-furnace gas. The writer refers to the striking discovery of the last few years that the blast furnace is an ideal gas-generator, the importance of which is only now being perceived. The practical difficulties in the way of using blast-furnace gas for motor-power purposes have been almost completely overcome. That of its low heating value—about one-fifth that of coal gas—is met by the use of much higher compression in the engine cylinder. The worst trouble is the dusty character of the gas; but this has been largely got rid of by sufficient washing. The only really serious difficulty in the way of the utilization of blast-furnace gas lies rather with the engine than with the fuel, and is a question of the possibility of making gas-engines large enough to enable the gas to do the work which is waiting for it. Small motor units are of no good in this connection. The engine must be proportionate to the large fuel supply and the heavy work to be done; and about 600-horse power units is the minimum. The Oechelhaeuser engine is characterized as specially suited for blast-furnace gas. It is of peculiar design, having one long cylinder, in which two cylinders (one at each end) work in opposite directions; and there is an auxiliary double-acting air-pump. The working charge is compressed to 8 or 10 atmospheres at the inner end of the stroke, when the two cylinders are nearest together, and the ignition is electrical. The cycle which now begins is too complicated to describe shortly; but the engine is reported to be working well at the Hörde Iron-Works, in Westphalia. It is being made in sizes up to 1500-horse power with a single cylinder.

Investigations of Wind Pressure.

The method of investigating wind pressure employed by Mr. Irminger, of Copenhagen, consisting in experimenting with solid resisting bodies of different shapes, in a current of air, has been followed up by two French experimenters, MM. Le Dantec and Canovetti. The results have been reported on to the Société d'Encouragement, by M. Barbet. The method of M. Le Dantec is very simple, and is based on the falling of bodies vertically through the air. The surface which is to be experimented with slides down a vertical wire, which acts as a guide without introducing perceptible friction. The weight and superficies of the body can be accurately determined; and Le Dantec has now devised an electric recording arrangement for ascertaining the time of falling. The observer can vary the height of fall so that the descent of the body occupies one, two, three, or more seconds. A number of such experiments, carried out in a lofty enclosed space, gave concurrent indications. A datum was obtained by the fall of a square of 1 metre side, moving with a velocity of 1 metre per second. Surfaces of the same area, but of different forms—circular, square, and an equilateral triangle—showed that the resistance to the air depends on the form of the surface; and the results accord with the hypothesis that the resistance of a surface is proportional to the length of its contour. For velocities varying within certain limits, the law of proportionality of the resistance to the square of the velocity was verified. M. Canovetti experimented with bodies of different shapes sliding down a long inclined wire, on a small truck like a trolley. The trolley-wheels ran in ball-bearings, and the test bodies were hung below it. The length of the run was 280 metres; and the time was taken by chronograph. Canovetti finds that the resistance of the air on a surface of 1 square metre, moving with a velocity of 1 metre per second, is 90 grammes for a square and 80 grammes for a circle. A hemisphere put in front of the circle reduces the resistance to 22·5 grammes; and a right cone with an altitude of 1·5 times the diameter attached to the rear of the circle, reduces the resistance to 60 grammes. Finally, by covering his falling bodies with a network, similar to that of a balloon, Canovetti considerably increased the resistance.

The Coal Areas of Canada and Nova Scotia.—The coal areas of Canada are estimated at 97,200 square miles, not including areas known, but as yet undeveloped, in the far North. There are (1) the coal-fields of Nova Scotia and New Brunswick; (2) those of the North-West Territories; (3) those of the Rocky Mountains; and (4) those of British Columbia. The coal areas of Nova Scotia cover about 635 square miles, and are divided into the Cape Breton, the Picton, and the Cumberland basins. The workable thickness of the coal is very great. In Cape Breton, it ranges from 25 to 60 feet; in Picton, to at least 70 feet; and in Cumberland, to at least 30 feet.

The Limitations of Electric Power Transmission.—Writing on this subject in the current number of "Cassier's Magazine," Dr. Louis Bell says that, looked at commercially, successful electric power transmission hinges on the cost of hydraulic rights and their electrical development on the one hand, and the cost of locally generated power on the other. Generalizing becomes, then, the result of examining a large number of concrete cases. Taking these as they come, it is within bounds to say that, considering transmissions of 500 or 1000 kilowatts, nearly all those at distances no greater than 15 to 25 miles will pay, if the output can be marketed. From 25 to 50 miles, many will pay; but the circumstances must be rather favourable. From 50 to 100 miles, a few large enterprises under good conditions will succeed, while many are of dubious value. Beyond 100 miles, cases of probable or certain success are rare; but assuredly they exist. He points out that these limitations are necessarily rough; but he says they express the facts as we have them to-day.

The Kitson Incandescent Oil-Lamp.—A feature of the National Export Exposition which has lately been held in Philadelphia was the lighting of the central pavilion of the main building, the two floors of which were illuminated by about 120 Kitson lamps, which were described in the "JOURNAL" for the 28th ult. (p. 1303). The apparatus that was used for furnishing the oil and supplying the pressure to these lamps covered an area of about 20 square feet of floor space, whereas an electric plant capable of furnishing as much light would consist of a 150-horse power engine and boiler, a dynamo and pump, which, with the necessary bin for coal supply, would cover at least 450 square feet, or more than twenty times the space required for the Kitson apparatus. We learn from a Philadelphia paper just to hand that a great many visitors were under the impression that the light was some new development of electricity, and could scarcely credit the fact that it was produced from kerosene oil. During the recent International Commercial Congress, the Kitson exhibit was quite a centre of attraction for the visiting delegates.

COMMUNICATED ARTICLES.

THE AUTOMATIC COIN METER.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

The automatic coin meter, conventionally spoken of as the slot meter or the slot system, has lately been under discussion both in New York and in London. It is an interesting coincidence, as illustrating the cosmopolitan character of our industry, that within a fortnight or so of the introduction of the subject to the American Gaslight Association by Mr. Strecker, and before the paper read by that gentleman had been published in this country, the same topic should form the theme of a paper read at the meeting of the Southern Association of Gas Engineers, held at the Holborn Restaurant. The chances are that just about the same time that Mr. Strecker's views were being made known to his *confrères* in New York, Mr. Eldridge was gathering together into concrete form the numerous statistics comprised in his carefully prepared paper.

Nor is the coincidence confined to the mere title. Similar subjects may be treated after diametrically opposite methods, or the second author may take up the thread at the point where the other left off. In this instance, however, both papers were plain narratives of actual experiences, dealing with the practical side of the question rather than the theoretical; and confined to the particular, rather than expanded to a broad and general view. A similar trend is also observable in the discussions. At both meetings, there were speakers who were perfectly satisfied with the results secured by means of the new system; but there were also others who, while satisfied with the additional business, obtained largely from customers who could not be secured in any other way, were somewhat dubious on the matter of outlay, and inclined to question whether the game was worth the candle—or perhaps it would be more appropriate to say the gas. In both cases, incidental reference was made to short-period payments and prepayment systems, as distinct from the slot meter. But there was not a complete unanimity. The English gas engineers, for example, had very little to say on the all-important question of "shortage." But in America, the necessity for protection from robbery, and for dealing with "shortage," was made somewhat prominent. One gentleman gave as a reason why some classes of customers applied for automatic meters, a hope that they could beat the machine. Customers who intend to beat the machine, if possible, are undesirable on any terms. In England, again, the use of tokens as a recognized auxiliary to the slot system is, it appears, quite unknown; but in America they have been adopted in various ways. Not only are they used by the consumer with the consent of the gas company; but they are sold over the counter at the gas offices, or furnished through the medium of an auxiliary machine, which automatically supplies tokens in exchange for coin. Another point that is incidentally manifested in the discussion is that the quarter-dollar, corresponding to our shilling, is the coin generally employed in America.

The use of tokens in any form cannot be viewed with favour; and they are open to the objection of bringing in an additional element to an already sufficiently elaborate transaction. It also robs the slot system of its essential and characteristic feature—that the cash should actually be paid before the gas is used. The special attraction of the plan, as compared with any short-period system or prepayment arrangement, is that the consumer pays in small sums as he goes, and incurs no further liability. When the use of tokens comes in, however, it is difficult to see the advantage gained, as the same end could be obtained with the ordinary meter, thus saving the cost and maintenance of the elaborate automatic mechanical arrangement. The employment of tokens by the consumer, instead of cash, is, in effect, a short-period collection. Instead of using the tokens as a means of computing the sum payable, it would be simpler to read the meter and prepare an account in the usual way. For this purpose, an ordinary meter would answer quite as well as a slot. If the consumer wishes to keep a running record of his indebtedness to the company, the meter-index furnishes a means of doing so; and it is quite as simple to record the index from time to time on a special card ruled for the purpose, as to count the tokens inserted in the slot. Again, it is too much to expect that the average consumer would take care to leave a cash sum equivalent to the number of tokens used, in readiness and in waiting for the visit of the collector. Frequently it would not be "convenient" to redeem the tokens in hard cash at a minute's notice, in which case the collector would have to "call again," just as he does under the usual quarterly system. The extensive use of tokens by the consumer without the consent of the company would soon lead to trouble, because the very people who would take most eagerly to tokens are the class whose cash the company desire to secure, and, indeed, look upon the slot system as a means of securing. The consumer's token leaves an opening for bad debts, the magnitude of which would be determined by the intervals between the periods of collection. If the use of tokens is limited to a particular kind, which can only be obtained by purchase over the counter at the gas office, there is certainly the advantage of making sure of the cash. But people will object to the trouble of sending to the gas office, and of accepting the responsibility for the safe custody of the tokens until required. They will not like the frequent visits to the gas office, nor will they look with favour on the payment of considerable sums in advance. At the best, it comes down to a prepayment system that could probably be better met by the plan of the collector calling at the premises, receiving so much cash, and setting the meter on in proportion. But it also offers increased facilities for the ingenuity of the gentleman who wishes to beat the machine. These plans are simply roundabout ways of doing what can be, and is already being, done by short-period collections or prepayment systems. The only advantage offered by the exchange machine is that of due protection from robbery. It fixes upon the consumer the responsibility of taking care of the money until actually applied for by the company's agent. But it adds both to the first cost and to the working expenses. The objection is already raised that the slot system is too costly, and that the greater part at any rate of the new business could be obtained by less expensive methods. The first cost of an exchange machine would be no trifle; and the labour involved in collection would be doubled. The collector would first empty and examine the machine, and then the tokens in the meter. He would compare the two, and return the tokens to the machine. All of this could obviously be effected by simpler and less elaborate methods. It is for the advocates of the slot meter to show that it is superior, not only to the time-honoured quarterly collection, but to weekly, fortnightly, or other short-period plans, and also to the devices known as prepayment systems. If it cannot do this, where is the equivalent for the cost of the automatic device, which nearly doubles the outlay on the meter, and for the extra labour involved in clearing the tills, and dealing with the large number of low-value coins? If, on the other hand, we are satisfied that it brings in a good line of business that could not be obtained by any method involving the use of the ordinary meter only, its efficiency is at once established.

The discussion on the slot-meter system brings out strongly a disadvantage common to all gas companies. Though a legal liability to statutory concerns only, all gas companies come under its lash by common consent. While the gas company are bound to maintain at all times a sufficient supply, pressure, and quality of gas, there is no corresponding obligation on the consumer. He can use the gas all the year round or not at all, as he may choose. Any person can demand to have a large service and a 50-light meter fixed; but he cannot be compelled to use a proportionate quantity of gas. He may perhaps only consume sufficient to represent a fair average for a 5-light meter. If the business of a gas company does not include a large proportion of regular customers, that company must suffer great injustice. The Acts of Parliament tacitly assume this to be the case; and anything that tends to increase the number of intermittent or variable customers, tends also to increase the difficulties of the manager, who is expected to keep down the cost of the gas to the lowest possible limit. An important feature in the development of the slot system is to see that the new business is of a fairly regular kind, and not such as to considerably add to the class of irregular users. An ordinary meter that is at rest for a considerable period of the year, is not profitable, and may be a source of loss; and this applies to a greater degree to the slot. On the principle of the ordinary axiom that there are two sides to every bargain, it would appear that if the company lay a service, and guarantee to keep it properly charged, then the consumer on his part should be bound to consume, or at any rate to pay for, a fair minimum according to the size of the supply pipe. The greater the expenditure for the consumer's special behoof, the greater the loss in the case of low consumption. And if the company incur the risk and expense of providing, not only the slot meter, but also stoves or fittings, it is only right that the consumer should be prepared to guarantee them from actual loss. Outlay per consumer is a definite quantity, decided by the management in the first place. But there is no previous experience or definite data to aid in fixing the amount that may wisely be thus invested; so it is not much removed from guesswork. If it is decided to spend £5 per consumer, the company know that 100 consumers will cost £500; but there is no corresponding definiteness on the other side of the ledger. It is possible to estimate roughly about what rate of consumption may be expected, but nothing further; and, in effect, the consumption is a very indefinite quantity depending upon the habits of the customer. There must be a return to pay interest on capital and depreciation on apparatus; and the average consumption per consumer enables us to arrive at the additional charge per 1000 cubic feet of gas required for this purpose. Starting from zero, and figuring on a gradual increase at the rate of 1000 cubic feet per annum, a stage will be reached which forms the turning point between profit and loss; and this turning point is in practice somewhere about 10,000 cubic feet. Every 1000 cubic feet per annum above this, means additional profit; every 1000 feet below it, means loss. It is therefore obvious that the party who is able to report an average annual consumption of 15,000 to 20,000 cubic feet is not only covering his special expenditure, but also getting a substantial contribution to the general funds out of the slot department, and so is loud in his praises of the system. But another, who has made a similar outlay, may perhaps only realize an annual consumption of 8000 cubic feet, and must come to the general funds for a contribution towards the special expenses of the slot department. He, therefore, does not feel so comfortable, or so assured as to the success of the system, as his more fortunate friend.

But the low-average man need not take too gloomy a view of his case. The slot system may be regarded as possessing some advertising and educational value; and therefore the loss is not absolute. The consumer who at present only uses 8000 cubic feet per annum, may burn 10,000 cubic feet next year, or be the means of introducing a new 10,000 cubic feet customer. One hundred small consumers, each using gas cooking-stoves, represent a class of consumption that is more profitable than that of some large consumers, who perhaps use no gas worth speaking of for eight or nine months in the year. Again, though the system may not appear profitable when figured out on the basis of the average cost of the gas made by the company, it may yield a profit on the actual cost of the additional gas sold by its means, which would be less than the average. A certain gas-works may be sending out 80 million cubic feet per annum; and the average cost may be 2s. 6d. per 1000 cubic feet. Suppose that 1200 slot meters are placed, increasing the consumption to 90 millions. The *pro ratâ* cost of this 90 millions will be something substantially less than that of the 80 millions, and the actual cost of the additional 10 millions to the concern will be lower still—probably nearer 2s., or even 1s. 9d., than 2s. 6d. Taking it as 2s., we have a saving of 6d. per 1000 cubic feet, or £250, which represents 4s. 2d. per meter per annum, and is more than sufficient to pay a fair rent on it.

The case of the comparatively large consumer must not be overlooked, because no company would wish to make an exorbitant profit out of any one consumer. The user who averages 20,000 cubic feet per annum pays twice as much for rent of meter, stove, &c., as the user of 10,000 cubic feet; and if the latter pays enough, the former pays too much. So there is something in the plea that all gas used in excess of the turning point should be supplied at ordinary rates. It is not a fair answer to urge that the surplus goes towards covering the loss on other customers, because two wrongs do not make a right. One way of meeting this claim is by returning a rebate or discount to the large consumer. Taking the highest additional rate that is likely to be accepted —say, 10d. per 1000 cubic feet above the ordinary charge—with a view of bringing the turning point down to a low consumption, and thus guarding as far as possible against *minus* customers. Suppose the ordinary rate to be 4d., and the slot rate 5d. per 100 cubic feet, the clearances to be made once a month, and the sum required to pay the rental charges 1s. per month. Then the consumer would be entitled to a discount or a return of 10 per cent. on the excess above 5s. found in the box at each clearance. If there was 7s. 6d., he would be entitled to 3d.; and a convenient way of dealing with this 3d. is to put it through the slot after fastening up the cash drawer, so that it goes towards the next month's gas. This system affords the advantage of aiding in the direction of increasing the consumption per consumer, upon which hinges all the difference between loss and profit. It also illustrates the loss due to low consumption. If an excess of 2s. 6d. means 3d. excess of profit, a deficiency to the same extent means a corresponding loss, in addition to the indirect loss of profit on the gas not sold.

After all, the slot-meter system resembles the Irishman's new shoes. One cannot tell how it will answer until it has been tried for a year or two. The experiences at other places may be a valuable help; but the very diversity of these experiences proves their unreliability as applied to one particular case. Even in districts that appear exactly similar in character, the average annual consumption varies as much as 4000 cubic feet. In commencing the system, it is preferable to make a practical trial on a sufficiently large scale—say, of 100 consumers—on tentative terms, because when one person asserts that the special expenditure on the slot system is not less than 9d. per 1000 cubic feet, and another that 3d. is sufficient to cover it; when one says that the collecting and clerical labour is doubled, and another that it is substantially reduced; and when one states that he had to increase the gas-fitters' staff on account of increased complaints, and another that he was able to dispense with the services of one fitter—it is difficult to know how much, or how little, may be applicable to a particular case.

THE READING OF PRESSURE-GAUGES.

By S. Carpenter, of East Ham.

I find that, when writing my previous articles, I omitted to explain the use of the vacuum and pressure gauges, which I consider to be the keys of gas-works. There should be gauges on the inlets and outlets of all the apparatus employed in the manufacture of coal gas, as they show the vacuum thereon, and also whether there is forming within them any accumulation which would cause a stoppage. There should be a pressure-gauge on the outlet of the exhauster, on the inlet and outlet of each scrubber and purifier, and in the middle of the latter, between the layers of the purifying material. The last-named gauges indicate to the manager the pressures which the different layers are causing. In reading the gauges, it is best to proceed in the following manner: Note the vacuum on the exhauster, the hydraulic main, and the condensers, and record it in a book (once a day); also notice if there is any difference between the inlet and the outlet. If there is more vacuum on the latter than on the former, it will show there is something accumulating, and an indication will be given as to where the obstruction really is. This should be attended to at once. The readings of all the gauges should be entered in the same book each day; and by comparing the entries a manager will soon be able to ascertain whether there is undue pressure, and whether the daily records correspond. The services leading to the gauges should be cleaned out twice a week. This duty may be entrusted to the gas-service cleaner. If the operation is frequently performed, it will keep the gauges in good working order; but if it is neglected, they will only mislead.

Great care should be taken in reading the gauges, especially those showing the vacuum. Supposing you have a 2-inch tar-seal on the dip-pipes, it would be necessary to have 18-10ths of vacuum on the hydraulic main, as the gas should be drawn off therefrom as quickly as possible. In the first three hours of the charge, the gas is abundantly produced, and a thick heavy smoke issues from the coal, occasioned by the presence of tarry vapours, which become condensed, and tar is obtained. If this is subjected to back-pressure, it will cause a deposit of carbon on the retort and a stoppage of the ascension-pipes. There is no doubt that by the use of the exhauster, so as to keep the pressure off the retorts, the number of stopped pipes will be reduced and the deposit of carbon greatly lessened. In the first hours of the charge the ascension-pipes are very full of the black viscid fluid, which adheres to their sides; but in the last hour, the hot gas will cause it to become dry and jagged on the interior of the pipe. The next charge will add more; and at last the pipe will be entirely stopped up by the accumulation of carbonaceous particles, which would interpose an insurmountable barrier to success. Indeed, this is one of the troubles most seriously felt in connection with the manufacture of gas. Then we see the necessity for drawing off the gas from the retorts by vacuum as quickly as possible, to avoid its being subjected to back-pressure. A manager should be careful not to have too much vacuum on the hydraulic main, as it would draw atmospheric air up the ascension-pipe, which would be detrimental to the illuminating power of the gas.

It is a good plan to have a cluster of gauges fixed in the meter-house—one each for the hydraulic main, the condensers, the outlet of the exhauster and the inlets to the scrubbers and the lime and oxide purifiers, and the inlet and outlet of the gas-holder. They should be fitted in a case and fixed in a conspicuous place, where they can be seen by day or night. It must not be said that this cannot be done, as the writer has done it for years. He has had services from 100 to 200 feet long, and they have worked well. It is a great help to the manager to have the gauges fixed all together, where he can see them at any time. If it is not practicable to fix the gauges at all the places indicated, the writer advises managers to have a gauge about 24 inches long fixed in a tin case, so that it can be carried from one apparatus to another, and the pressures taken. It must not be said that it will be too much trouble to do this, for the writer has done it himself twice a day in the winter. It will keep a manager well posted up as to the state of the hydraulic main and the various appliances; and should there be any obstruction accumulating, it will indicate where it is. This will save much time as well as anxiety. When a stoppage is likely to occur, if the spot is not quickly found, there is no knowing what damage will be caused. If the writer's advice is taken, he thinks that such stoppages will be prevented. He has himself taken the pressures for years in the way described, and has found that it has saved him a great deal of trouble.

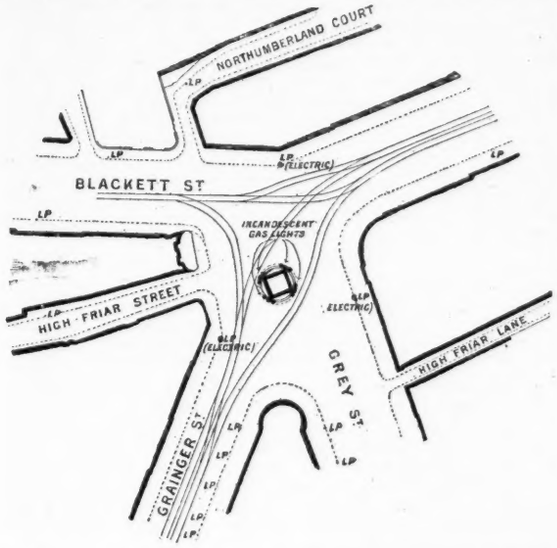
The Kent Coal-Boring Operations.—Another seam of coal was passed through on the 2nd inst. at the boring at Ropersole, between Dover and Canterbury. The seam was 6 inches thick, and of excellent quality. This makes the third thin seam passed through at this boring, which had been stopped for many weeks owing to a part of the machinery being lost in the operations. From fossiliferous evidence, it is believed that the boring is passing through the upper coal measures. If so, it is concluded that the carboniferous strata must continue to a very great depth in this part of Kent.

British Association of Water-Works Engineers.—Mr. W. H. Brothers having resigned his position as Secretary to the Association, the Council invited Mr. Percy Griffith, of 55, Parliament Street, Westminster, to take over the duties for the twelve months commencing the 1st inst.; and as some difficulty has been experienced in finding a suitable successor to Mr. Brothers, Mr. Griffith has consented to accept the appointment for the time being. Mr. Griffith being himself a member, his interest in the welfare of the Association is assured. For some time past the Association has used Mr. Griffith's offices as a London address; and it is hoped that the appointment of a London Secretary resident at this address may prove an advantage to the Association generally and to the members in particular. It is requested that all correspondence with reference to the Association should in future be addressed to Mr. Griffith; and members and others interested in the work of the Association are invited to call personally upon him should they require information relating to it, or wish to refer to any of the journals, pamphlets, or books belonging thereto. The next meeting of the Association will be held in London some time in February next, when several interesting papers have been promised, and the ballot for the Council and officers for the year 1900 to 1901 will be taken. Further particulars of the meeting will shortly be announced.

TECHNICAL RECORD.

INCANDESCENT GAS v. ELECTRIC LIGHTING IN NEWCASTLE-ON-TYNE.

By the courtesy of Mr. W. Doig Gibb, the Engineer of the Newcastle-upon-Tyne and Gateshead Gas Company, we are able to give particulars of an interesting installation of incandescent gas lighting which has just been carried out by them in the part of the city shown in the accompanying plan. Up till lately, the central space at Grey's Monument has been lighted by three electric lamps, each nominally of 1500-candle power, and costing £40 per annum, or £120 in all. The Gas Company have recently put up at the corners of the monument four lamp-posts, each carrying three lanterns fitted with two No. 4 Kern burners—a total of 24 burners. These have an average illuminating power of 2160 candles, as ascertained from actual tests made in the photometer-room. The total estimated cost for gas supply, maintenance, attendance, &c., is £52 18s. 8d. per annum.



The Lighting Committee of the Newcastle Corporation decided at a recent meeting to have the electric lamps surrounding the monument extinguished for a period, to enable the members to witness the effectiveness of the incandescent gas lighting; and their decision was carried out on Monday night last week. They assembled in goodly numbers about eight o'clock, and walked round the monument; testing the lighting from various standpoints. They were apparently well satisfied that the new lights were thoroughly effective, and that the electric arc lamps were superfluous; in fact, when they were switched off there was very little, if any, difference in the illumination of the space. The Committee then proceeded to inspect other incandescent lights which, by their order, have been put up in the neighbourhood of Barras Bridge. The night was damp and murky; yet a beautiful glow came from the Grey Monument, lighting up the surrounding thoroughfares perfectly.

HINTS ON PRACTICAL GAS-FITTING.

A short time ago the "Sanitary Plumber" contained an article on this subject, from which we make the following extracts.

The first thing to be done when fitting up a house is to be sure that the plans are properly marked, and that every light desired by the owner is indicated thereon. One will usually be well paid for the trouble if he calls upon the wife of the owner, and looks over the plans with her, calling attention to each light, and questioning whether or not it is located so as to give the best possible service. It should also be ascertained what kind of mantels are to be used. Those of extra height, or having mirror cabinets, should have the gas opening of their jambs placed on the side of the jamb, and facing at right angles to the face of the mantel. Ordinary bracket dresser lights should be about 4 ft. 9 in. from the floor; hall brackets, 6 feet; mantel brackets, 5 feet; bath-room brackets, 6 feet; alcove lights 4 ft. 9 in.; and attic or short storey lights placed as high as the ceiling will permit, not going above the schedule heights. Care should be taken not to locate bracket lights where doors can be opened against them, as the least damage that can result from such errors is the breaking of a globe or bracket. Many fires have been started in this manner. Newel post lights and those for dining-room sideboards, as well as kitchen lights, when the kitchen is only one storey, are, as a rule, supplied by a branch from the riser in the basement.

On general principles, it is better to use a 10-feet pole for centring rooms, even if the foreman has to measure it off himself. A tape-line often has a little off at the end, which one forgets to allow for, or the figures are dirty. A gas-fitter cannot keep a line clean, and for this reason he usually has a cheap one which will not bear washing, and which also stretches more or less. Stepping off measures with a pocket rule is bad practice, as there is not always a place to mark, and one is apt to lose or gain on the actual distance. Measuring with the pole ensures more accurate and quicker work; and there is no chance of mistakes by holding the end at the wrong place, which often occurs when a helper is depended upon to hold a line.

Locate the riser of a job as close to the service-pipe as convenient. If the main is in the street, put the riser close to the front; if it is in an alley at the rear, put the pipe as far back as circumstances will permit. Make the riser enough to extend about 6 inches below the first-floor joists. A central location of the riser is often recommended by fitters on the ground that it saves big pipe. This is a mistake. The riser must be carried to the centre, either downstairs or up; and, in addition to that, big pipe must be run both ways, front and back, on the upper floor when the riser is centrally located. It does, however, sometimes save cutting joists equally and in undesirable places. In centring rooms having sliding doors, remember that one of the partitions between which the door will slide is likely to be of studding, and is seldom in place when the house is measured for gas-pipe. For this reason, if the fitter is not careful, he will get the drop in one side of the room by centring without allowing for the partition not yet erected. When locating pipes, partitions, or centres on the plans for any purpose which brings the relative position of other rooms, either above or below, into consideration, always measure from the outside face of the walls, as this is regular, and generally free from jags or offsets. When centring rooms in the building itself, always take care to allow for offsets in the walls. The walls on one or more sides of a room may offset between the floor and the ceiling; thereby making the room in which the measuring is being done larger than the one in the centre of which it is intended to have the pipe. Remember, when allowing for a stairway or hall partition cutting off one side of a room, that 1 foot variation in the location of the drop will compensate for 2 feet off the room, and that an offset of 4 inches in one wall only requires the drop to be 2 inches out of the true centre of the room as measured above. It is not always proper to put lights in the exact centre of rooms, regardless of surroundings. Pay no attention to a joist throwing a drop an inch or so out of the way.

Chimney-breasts or any minor extension of, or projection into, rooms should not be regarded when centring them. Put the light in the centre of the space bounded by the chief walls. If slightly moving the drop from the centre of a room will bring it in line with the drop in the centre of another and more prominent room, it is sometimes a good plan to do so, especially if there are sliding doors between them. Having the fittings even with each other makes a better appearance than otherwise when the doors are open.

In the case of dining-room drops, the fitter will have to be guided by the position to be occupied by the table. If the room is of ample size, and there is nothing to prevent the table from being placed in the centre, then locate the drop in the centre of the room, or with reference to the position of the drop of one of the other rooms, as before suggested, if thought best.

All bracket openings for the second floor of a building in coal and water gas work are usually taken from the pipes which supply the drops and brackets of the first floor. This saves running large pipe up to the third floor, and through the third-floor joists; and it also takes a shorter piece of pipe to reach the proper height from the second floor than it would to come down from the third, especially when the ceilings are very high. Then, too, there are often two bracket openings over each other, so that one run of pipe over to the wall will answer for two lights; while if they were run separately it would take two pieces. The first-floor lights are run down from the second floor instead of up from the cellar, because they are few in number, and the fitting from the pipe from the basement up to the different points would entail greater cost.

Some people prefer drop fittings for toilet lights in the place of wall brackets. These drops should be about 15 inches from the wall. There are bracket toilet chandeliers made, for which the opening must be placed in the side wall instead of in the ceiling. Both are open to objection, however, as they are in the way of moving the dresser in or out of place.

Never run a newel post supply until the stairs are finished, as the post seldom comes just where it is shown on the plan. Never get out pipe for one floor by the plan or diagram of another, no matter whether or not the arrangement of the rooms is supposed to be the same.

In putting in gas-pipe, care should always be observed not to have any traps in the pipe, and to have the pipe drip either to the fittings or source of supply. When it is possible to drip the pipe to the supply, be careful not to take branches off the trunk line on the bottom, as condensation would fall into them instead of going back to the riser. This accounts for certain fittings in many jobs giving trouble, while others act properly.

In order to give the pipe a continuous fall in all cases, either to the fitting or the source of supply, it is sometimes necessary to cut the joists through which the pipe is laid much deeper.

than the external diameter of the pipe. So it is best to run the pipe as close to the partition walls as possible, in order to prevent weakening the joists by cutting. Whatever kind of piping may be installed, it is advisable to run as much of it as possible on the interior walls, and keep the under-floor pipes as remote from the exposed walls as circumstances will permit. The interior walls and central portions of the floors are of the most equable temperature, and less likely to cause trouble by condensation of the gas. In factories or stores where the buildings get cool over Sunday in winter weather, it is well to have the piping done in such a way that there are but short branches from the trunk lines to the burners, as it tends to prevent condensation, especially if the gas is not well fixed. Buildings in which poorly fixed gas is used, and which are subject to variable temperatures, should have the piping arranged so as to circulate the gas by burning a jet under the pipe in the basement. This not only prevents freezing and annoyance from condensation, but improves the light if the gas is burned while warm. In circulating systems, it is well to have a bye-pass and cock at each governor, and to shut off the governor on each floor before lighting the circulating jet. If this is not done, the expansion of the gas will very likely blow the seal out of the governors. In factories and printing offices, the trunk lines should be made twice as large as is absolutely necessary, in order to be able to add additional lights after they are in operation; because invariably a greater number of lights are needed than those at first estimated. In all large buildings it is advisable to have a stopcock on the riser or main to each floor. Then if anything happens, such as a fitting getting broken off, or there is some alteration or extension of the pipe necessary, one floor can be shut off without affecting the light on the others.

As a rule, the following sizes and lengths of pipe are in practice acceptable to gas companies for lighting with coal or water gas:—

Nominal Size of Pipes.	Feet Allowed.	Number of Burners.
¼-inch	6	1
⅜ ,,	20	6
½ ,,	30	12
¾ ,,	50	20
1 ,,	70	35
1¼ ,,	100	60
1½ ,,	150	100
2 ,,	200	200

For vapour gas, increase the sizes given for coal and water gas at least 25 per cent., because vapour gas is of greater specific gravity than the others, and a smaller amount of it will issue through a certain size orifice under a certain pressure in a given time. Vapour gas condenses, too, and deposits a gummy substance which clogs the pipes more or less.

No set of rules for proportioning the lengths and sizes of gas-pipe will answer in all cases. The fitter must use his good judgment about the matter. Except in the case of bracket lights, we cannot tell whether one jet or twelve will have to be furnished with gas by the opening we leave for a fixture. Therefore it is best not to run any pipe horizontally of less than ⅜ inch diameter; and for parlours and other rooms likely to want a great number of lights, put in ½-inch drops. In fitting pipe for coal and water gas, it is always understood that bracket pipes are made of ½-inch pipe. For this reason, it is unnecessary to designate the size of them upon working diagrams. For vapour gas, never make a bracket pipe of less than ⅜ inch, unless on the lower floor of a building several storeys in height; and never, on any occasion, put ½-inch pipe under floors. In vapour-gas work, the bracket pipes should always be run downward from the upper floors instead of upward from the lower floor, as is usually done on coal-gas work. In this way the gravity of the gas in the bracket pipes is made to maintain the pressure, and the extra head of pressure otherwise necessary to overcome the friction encountered in the bracket pipes is unnecessary. In changing from the use of coal or water gas to vapour gas, it is well to run a feeder riser up as high as the attic, and return, connecting with the old system at two or three points. The gas will in this way spread through the pipes and give a good supply with only the head of pressure due to the gravity of the gas; while if the old riser introduced the gas, perhaps double the pressure would be necessary to overcome the friction in the small pipe. When a main is connected in this way, let the old riser serve as a drip to the system.

Coal gas, and other gases of less specific gravity than atmospheric air, but of about the same gravity as coal gas, increase about 1-10th of an inch water pressure for every 10 feet the pipe is extended vertically. Consequently, everything considered, there is always the best pressure on the top floor. In towns which have greatly varying street levels, there are often two systems of mains—one for the high, and the other for the low district. By means of governors and feeder mains, such towns have about equal pressure at all points. It is well to ascertain what provision is made by the gas company for varying pressure before making any compensation for high levels in the piping of a house. If the building to be fitted is very high as compared with the altitude of the holder supplying the gas, and is one in which the use of a governor would not be desirable, the excessive pressure may be counteracted by running a smaller pipe than usual. An experienced man should, however, determine the sizes to be used in such cases. On the other hand, if the building is low as compared with the source of supply, the pipes should be of full size, or even larger than is called for. In factories or business buildings where a great number of lights are used, it is best to place a governor on the main branch for each floor. Then, regardless of what the pressure would be without the governors, the gas can be burned at all points at about 5-10ths pressure, which is the most economical one at which it can be consumed. In store buildings or factories, where nearly all the lights are in rows, it is economical to locate the trunk lines near the lines of lights, as it saves running over to the centre from the side, or in the contrary direction, as the case may be.

WATER SUPPLY TO COUNTRY MANSIONS AND ESTATES.

At the Meeting of the Society of Engineers on Monday last week, a paper on the above subject was read by Mr. Gordon Harris, Assoc.M.Inst.C.E.

In introducing his subject, the author observed that the cost of supplying an estate with water by the antiquated methods of either manual labour or uneconomical steam-engines was very high. A gravitation scheme was much preferable, provided the source of supply was not too far distant. The objections to manual labour were pointed out, and pumping by animal power was considered more economical than hand-power pumping. A small steam-engine was not desirable, on account of the heavy fuel bill and cost of attendance it involved. A gas-engine could rarely be used in country mansions, owing to the absence of a gas supply; but where gas was available, such an engine was very advantageous. The oil-engine was strongly recommended as possessing every advantage as regards its fuel supply, its simplicity, and its economy in working. The author then gave the following comparison of the cost of pumping 1000 gallons of water to a height of 100 feet by various powers:—

	Pence.
1.—Hand labour, at 18s. per week	26·50
2.—Horse power, man at 18s. per week	4·20
3.—Gas-engine and pump, with gas at 4s. per 1000 feet	1·44
4.—Small steam-pump and boiler, with coal at £1 per ton	0·75
5.—Oil-engine and pump, with oil at 7d. per gallon	0·70
6.—Electric pump, worked from a lighting dynamo.	0·45

The cost of attendance is excluded in Nos. 3, 4, 5, and 6, as in some instances it may be negligible, although in No. 4 there should be an allowance varying in amount with the total daily supply and other conditions, and an addition must be made for coal used in getting up steam. As the cheapest and most lasting water raiser, the author stated that the hydraulic ram still retained its popularity. Water-wheels, hydraulic pumps, and windmills were also discussed, and their respective advantages and disadvantages pointed out.

Examples were given of the practical application of the mechanical agents referred to, and installations of various kinds on several estates and in large establishments were described and illustrated. Among other useful pumping appliances employed, the "Hatfield" treble-barrel pump was referred to. This pump can be driven at 700 revolutions or more per minute, and may therefore be coupled direct with an electric motor. Another engine, known as the "Squire's," has also been designed for special use on estates, and is applicable to general purposes as well as for water supply.

The author next dealt with the question of well-boring, concerning which much useful information was given. The subject of locating water by divining was also touched upon—the author observing that some very curious successes had been achieved by this means; but at the same time he instanced a case in which he was consulted where the diviner's prediction had proved utterly valueless. The details of water supply, storage, filtration, and use were then discussed; and the most desirable appliances for the various purposes involved were described in detail. The supply of water to small villages adjoining large estates concurrently with that to the estate itself was also referred to, and its advantages, under certain conditions, were pointed out by the author.

The important question of the utilization of a portion of a water supply for fire-extinguishing purposes was next considered. The author observed that a large reserve must be secured for this purpose; and he described various arrangements of fire service which he had carried out in practice. They included gravitation and power systems. For meeting cases in which there is a deficiency of pressure, the author has devised an automatic pressure augmenter which he explained.

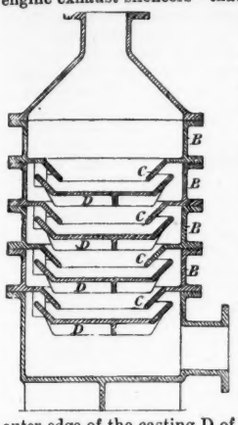
A discussion followed the reading of the paper.

The Cost of a Horse Power.—The Power Committee of the Engineers' Society of Western Pennsylvania have given as follows the comparative cost of steam power generated by various fuels used under a boiler (the figures being based on an engine of about 50-horse power): Natural gas: Consumption, 12·5 cubic feet per horse power per hour, at 22·5c. per 1000 cubic feet, $7·43 per horse-power year. Illuminating gas: Consumption, 18 cubic feet, at $1 per 1000 feet, $54 per horse-power year. Gasoline: Consumption, ⅛ gallon, at 7c. per gallon, $26·25 per horse-power year. Coal: Consumption, 4 lbs., at $1 per ton, $7·2 per horse-power year.

REGISTER OF PATENTS.

Silencing the Exhaust of Gas-Engines.—Crossley, W. G., of Manchester, and Atkinson, J., of Marple. No. 27,043; Dec. 22, 1898.

To get over the objection often advanced against the use of gas-engine exhaust silencers—that they commonly cause back-pressure—the patentees propose to carry the exhaust-pipe (at any desired distance from the engine) into a circular casting forming a base for the silencer. On this base is placed a section consisting of a circular casting B, the lower part of which is partially closed in by a more or less pendent bottom C, having a hole in its centre (say) twice the area of the exhaust-pipe, or preferably larger. The pendent bottom dips slightly below the upper edge of a saucer-shaped casting D, larger in diameter than the hole in the pendent bottom. The casting D may be suspended below the pendent bottom, and held up to it by bolts, as shown. A second section may be placed on the top of the first section; and as many more as may be required to give the desired amount of quietness to the exhaust. Finally, a plain cover, with an enlarged outlet-pipe, is placed on the top.

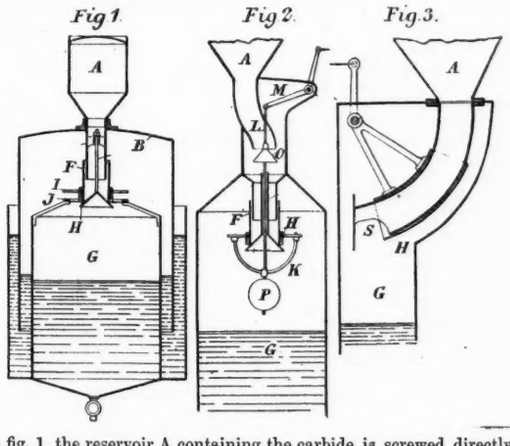


In action, the exhaust passes round the outer edge of the casting D of the lowest section; then inwards and upwards through the hole in its pendent bottom C; and so on, through all the sections, till it finally passes out at the top. This action alone has considerable effect, say the patentees, in reducing the noise of the exhaust; but "to obtain the best result, the saucer-shaped castings are kept partly filled with water."

Generating Acetylene.—Mills, C. K.; a communication from G. Tabard, of Lyons, France. No. 10,410; May 17, 1899.

This generator is characterized by the particular action of a valve on or against which rests the charge of carbide, and which remains fixed, but whose circular or other seat rises or moves away at the desired moment in order to allow a certain quantity of carbide to fall.

Fig. 1 shows the apparatus attached direct to the bell of a gasholder, suitable for apparatus of small production. Figs. 2 and 3 illustrate its application to generators separated from the holder, as arranged for apparatus of large production.



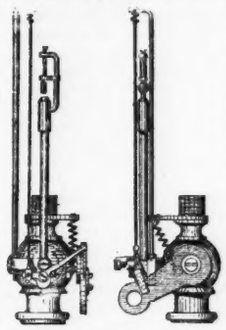
In fig. 1, the reservoir A containing the carbide is screwed directly on to the bell B of the holder, which covers the generator G into which the carbide drops. The reservoir is prolonged into the interior of the bell by a pipe, from which is suspended a conical valve by means of a central rod. The seat H of the valve, furnished with india-rubber or other elastic material, is carried by a tube F sliding without friction on the smaller fixed tube. The weight of the sliding tube (assisted when necessary by a spring or additional weight) holds the seat against the conical valve, and prevents the fall of the carbide; but each time the bell descends to the bottom of its course, on account of the consumption of gas, wings I, carried by the seat, come into contact with a fixed ring J. The seat then remains suspended during the time the bell continues to descend, and a certain quantity of carbide falls into the generator. The gas thus produced causes the bell to rise; and the seat returns against the valve, and arrests the fall of the carbide until the bell again descends.

In fig. 2, the movement of the bell is transmitted to the seat H by a central rod L, connected by a curved rod K, and suspended from a lever M, attached to the bell by any convenient means. The counterweight P assures the closing of the valve. For better safety, there may be placed on the rod L a valve O closing the exit of the carbide reservoir during the time the carbide is flowing through the distributor.

Fig. 3 shows an arrangement (based on the same principle) intended for large apparatus. It allows the passage of the carbide broken into large pieces and mixed with dust, which might choke up the preceding apparatus. The tube in continuation of the carbide reservoir A is curved for about a quarter of a circle, and carries at its extremity a disc arranged vertically. It is against this disc, acting as a valve, that the extremity of the tube H bears. This tube slides upon the curved tube, and in rising uncovers an opening S, through which the carbide falls. The moveable tube is fixed on an axis placed at the centre of the curve, and operated from the exterior by a lever connected to the bell of the holder by appropriate mechanism.

Self-Lighting Gas-Burners.—Zacher, F., of Hamburg. No. 15,760; Aug. 1, 1899.

In these self-lighting gas-burners (as shown in the engraving), an auxiliary or pilot burner is employed for the purpose of igniting the main burner; the auxiliary burner being fitted with an ignition-pellet, which is ignited by coming into contact with the gas when turned on. After having ignited the main burner, the auxiliary burner is automatically extinguished by the expansion by heat of a suitable body. The plug of the tap in the burner, according to its position, supplies a main and an auxiliary pipe with gas. The tap is under the influence of a spring; and on turning on the gas for the ignition of the auxiliary and the main burner, it is retained in such a position that the auxiliary pipe is completely opened, but the main burner-pipe only partly so (by means of a locking lever), until, by virtue of the expansion of a suitable body caused by the emission of heat from the auxiliary flame, a rotary movement of the locking lever is produced, which releases the tap and permits it to be returned by the spring to its medium position, in which the auxiliary pipe is completely closed, and the main burner-pipe completely opened.



The idea forming the basis of the invention has (says the patentee) already been attempted to be carried out in practice for a similar purpose previous to his invention; but the constructions arrived at did not solve the problem. A constant reliable action was unattainable, as "the expansion body was expected to fulfil work which it was impossible for it to perform."

The expansion body which—in order to obtain a sufficient expansion—has naturally to be a long thin rod or wire, was in previous constructions expected to exert a certain direct-pressure on a locking lever. To actuate this lever, the expansive force not only had to overcome the frictional resistance of the locking surfaces, but also the power of the spring which normally kept the locking lever in its position. In action, however, especially when heated and consequently in a soft and less-resistible condition, it easily suffers lateral distortion, and is then obviously rendered unfit for action. But, even supposing these drawbacks are not present, it is obvious that after short usage they must show themselves. The present invention therefore assigns a totally different purpose to the expansive body (the wire), which "it will be enabled to perform under any circumstances, and for an unlimited space of time"—viz., as shown, its contracting action only is employed, and not for exerting direct pressure. So that its work has not to be performed while in a heated condition, but when subsequently cooling down.

Self-Lighting Gas-Burners.—Bachmeyer, A., of York Street, Westminster. No. 15,900; Aug. 3, 1899.

This invention relates merely to the bye-pass arrangement of cocks for incandescent gas-burners, when provided with self-lighting appliances (consisting of platinum or other suitable material), which, when played on by a small jet of gas, becomes sufficiently heated to ignite the flame of the burner. The cock is so arranged that, on partially turning it till it meets a check, a small jet of gas is directed on the kindling appliance, but no gas passes to the burner. On turning it beyond the check to its full extent, however, the small jet is cut off, but there is a full supply of gas to the burner.

Generating Gas having Acetylene as a Base.—Richard, C. B., and Cohen, F., of Paris. No. 17,631; Aug. 31, 1899.

This apparatus for generating gas having acetylene as a base, consists of a number of bi-metallic cartridges, containing carbide of calcium, and forming a voltaic battery for decomposing, by means of an electric current, the acidulated water and compressed air passed into the reservoir, and serving to finally modify the nature of the gas produced. The gas enters a holder after having passed through a purifier, when normally working—or, in case of the purifier being choked, through a safety apparatus; finally flowing out from the holder through a gas-tube provided with a desiccator, in which it is deprived of moisture. An air-pump is so arranged as to suck up either the outside atmospheric air or that contained in the generating reservoir, for the purpose of compressing it in a special reservoir—particularly and preferably arranged in the interior of the gasholder vessel, from which it may be conducted as required to any of the generating reservoirs, by means of a conduit arranged for the purpose. The cartridges are made of a certain number of sleeves arranged one on another, for the purpose of receiving a charge of carbide of calcium, and mounted on a central perforated tube of copper. The water serving for the decomposition of the carbide enters at the lower part of the cartridge; while the gas produced rises into the upper sleeves composing the cartridge, passing out of it through holes provided for the purpose in the upper sleeve. The bi-metallic sleeves thus form a voltaic battery, the current of which decomposes the water, air, or other gas that may be used for the purpose of modifying the nature of the acetylene gas produced by the carbide and water.

Purifying Gas.—Chollar, B. E., of St. Louis, U.S.A. No. 17,888; Sept. 5, 1899.

This system of purifying gas consists "in effecting a flow of gas, having oxygen mingled therewith, through purifying material in one general direction, and then effecting a flow of gas having oxygen mingled therewith through the same material in a general direction the reverse of the preceding flow," for the purpose of reviving the fouled portion of material through which the gas first passes in the process of purification.

The practice commonly in vogue, the patentee remarks, is to pass the gas through layers of purifying material in purifying-boxes, in one general direction, and in regular order of sequence. The prevailing idea in regard to the chemical reactions during the process o purification is that the sulphur of the sulphuretted hydrogen combines with the iron of the ferric oxide, resulting in the formation of sulphide of iron—liberating

oxygen from the ferric oxide, which combines with the hydrogen of the sulphuretted hydrogen to form water. After the oxide has become so thoroughly saturated with sulphide as to be no longer sufficiently active for the purpose intended, it is taken out of the boxes and exposed to the atmosphere, where, by the action of the oxygen on the sulphide of iron, the iron is converted back into its original form—ferric oxide. This saturation of the ferric oxide with sulphide and revivification may be carried on repeatedly. But it has been found that, by the admission of a small proportion of oxygen into the purifiers with the foul gas, the process of revivification can go on in the purifiers simultaneously with the process of purification; the general reactions being as follows: The sulphur of the sulphuretted hydrogen attacks the ferric oxide, reducing it partly to ferrous sulphide and partly to ferrous oxide; and when atmospheric air is admitted, the air acts merely as a conveyor of oxygen, giving it up partly to the ferrous sulphide and partly to the ferrous oxide—thereby forming ferrous and ferric oxide over and over again, and liberating sulphur at each change—depositing it in metallic form in the purifying material.

From the foregoing it is evident, and, moreover, it is true in fact, the patentee resumes, that, having a bed of oxide (particularly a deep one) with a flow of gas containing sulphuretted hydrogen and oxygen passing through it—upwards for illustration—the lower section of the bed having received the maximum quantity of sulphuretted hydrogen in proportion to the oxygen, will become converted into ferrous oxide, and therefore inert, sooner than the portion nearer the top, where the proportion of the sulphuretted hydrogen relative to the oxygen is materially less than exists at the period of the initial flow of the gas into the purifying bed. It is also obvious, as well as true in practice, that if, when the oxide at the bottom has become inert (by reason of its then consisting largely of ferrous oxide), the flow of crude gas be reversed so as to take a directly contrary course to the flow just described, the oxide at what was previously the last portion of the purifying material through which the gas passed, and which had to deal with the minimum amount of sulphuretted hydrogen in proportion to the oxygen, and which is then in substantially ferric state, and in such condition that it can effectually take the place of the previously initially subjected portion of the bed of purifying material for the purpose of removing the sulphurretted hydrogen—at such time the oxygen contained in the gas with the minimum proportion of sulphuretted hydrogen, in flowing through, will re-oxidize from a ferrous to a ferric state the portion of the bed of purifying material that was originally the entrance portion. Thus one portion of the purifying bed may be utilized in carrying out the purification of gas, while the other is becoming revivified by the action of the oxygen combining with the original oxide to return the elements contained thereby to their original component parts for utility on the next reversal of the flow of gas. Oxygen and air are used indiscriminately. Ozone can also be employed as a conveyor for oxygen. It will be observed that the reviving is accomplished when there is little or no sulphuretted hydrogen present. The air, acting as a conveyor, gives up oxygen both to the ferrous sulphide and the ferrous oxide, thereby forming ferric oxide again. This process is repeated over and over again, liberating sulphur at each change. While oxygen has been specified, it is evident that such oxygen may be introduced into the gas in any suitable form, or by any suitable conveyor—it being preferable that atmospherical air be used.

It is (in line with the foregoing) the intention of the invention, the patentee remarks, in conclusion, to carry out a process wherein he is enabled to revive the iron oxide by following a plan of reversing the direction of flow of the gas through the purifier as often as is advisable or necessary, in order to change the chemical composition of the purifying material, whenever it becomes fouled by the gas passing through it.

APPLICATIONS FOR LETTERS PATENT.

23,619.—Beese, R., "Incandescent gas-lamp." Nov. 27.
23,621.—Bolbrinker, E., "Gas or oil engines." Nov. 27.
23,625.—Perry, T. J. & E. J., "Acetylene generators." Nov. 27.
23,629.—Shillito, T. R., "Pressure-regulators." A communication from the "Phönix" Maschinenbaugesellschaft. Nov. 27.
23,682.—Browning, A. G, "Water and liquid meters." Nov. 28.
23,723.—Strunk, G., "Gas-burners." Nov. 28.
23,731.—Quelch, G. H., and Kent, T. O., "Generation of acetylene gas." Nov. 28.
27,732.—Murphy, J., and Arnold, H. L., "Gas-valves." Nov. 28.
23,758.—Petterson, P. O., "Producing acetylene gas." Nov. 28.
23,770.—Burkitt, E. D, "Gas-burners." Nov. 28.
23,771.—Chandler, S., jun., & J., "Gas-governors." Nov. 28.
23,776.—Rowlands, H., "Smoke consumer for incandescent lamps." Nov. 29.
23,796.—Moorwood, T. P., and Jessop, F. C., "Gas-burner." Nov. 29.
23,797.—Bon-Accord Acetylene Gas Company, Chicken, B. R., and Smith, A. G., "Acetylene gas-generator." Nov. 29.
23,804.—Potter, W. G., "Gas-burners." Nov. 29.
23,831.—D'Humy, P. R. de F., "Lamps for giving an intense light." Nov. 29.
23,874.—Toby, F. L., and Borch, O. S., "Manufacture of carbide of calcium." Nov. 30.
23,877.—Thiersant, H. de, and Norballe, H. J., "Electric gas lighters." Nov. 30.
23,915.—Wright, J. W. B, and Randle, W., "Acetylene generators." Nov. 30.
23,937.—Adolfsson, A. E., "Acetylene gas-generator." Dec. 1.
23,959.—Curtis, G., and Baumann, G., "Syphon valveless water-waste preventer." Dec. 1.
23,988.—Leigh, H. H., "Acetylene gas-generators." A communication from J. W. Carey. Dec. 1.
23,999.—Denham, W., "Safety gas-lighter." Dec. 2.
24,043.—Schultze, K., "Automatic gas-igniters." Dec. 2.
24,056.—Zschocke, G., "Gas-scrubbers." Dec. 2.
24,060.—Drake, W. H., and Pelton, R. K., "Acetylene burners." Dec. 2.

The attention of the Wigan Borough Council has been called by the Chairman of the Streets Committee to the wanton destruction of gas-lamps in the borough. He states that since January last 1144 panes of glass have been broken in the lamps; but all he is able to do is to appeal to the public to assist the police in preventing such wholesale damage.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Trade Unionism and Rates of Wages.

Sir,—Will you allow me to say, in reference to the question of the effect of the Gas Workers' Union on wages, raised by your correspondent "F. G. N.," that the Union has never been instrumental in getting an increase of wages for the stokers of the Metropolitan Companies?

It is quite true that the Union greatly increased the cost of carbonizing per ton of coal, by reducing the work done per man; but the wages earned by a stoker were the same for the eight-hours shift as they had been since 1872 on the two-shift system.

Last year there was a real increase in the wages of retort-house men; but this was the result of the law of supply and demand, recognized by two Companies—one entirely free of the Union, and the other very nearly so—who took the lead in giving the advance in October, 1898. The other Companies who had been taken into the confidence of the two above referred to then immediately followed their example.

I may add that the eight-hour system had been in operation a great many years at Liverpool under the late Mr. Alfred King (father and predecessor of the present able and respected Engineer of the Company). It was, therefore, not new, and, moreover, as you truly say, its adoption in 1889 was merely "forcing an open door;" for both in 1887 and in 1888 it was offered to our men and declined.

George Livesey.

Dec. 9, 1899.

Sir,—The true answer to Pope's sophistical couplet, which you quote with something short of your usual courtesy, is the answer that a former Czar made to Madame de Staël's flattery, when she said his character was a constitution for his country, and his conscience its guarantee: "I, Madam, am but a happy accident." Are they "fools," indeed, who prefer the constitution of our country to the uncertainty of a succession of "happy accidents?" If so, I, for one, write myself down a fool gladly. I must, however, thank you for your quotation; for, on turning to its source, I find a passage (only twenty lines antecedent to those you recited) which so aptly expresses the benefit that Trade Unionism has brought to the working classes of this country, by the influence their aggressive and defensive power has had upon hard and selfish employers, benefit and influence which the gross abuse of that power cannot entirely destroy, that I cannot do better than transcribe them:—

> "His safety must his liberty restrain:
> All join to guard what each desires to gain.
> Forced into virtue thus by self-defence,
> E'en kings learned justice and benevolence:
> Self-love forsook the path it first pursued,
> And found the private in the public good."

Argument, as you say, is endless; and our discussion somewhat resembles the farmer's claret, in that it gets us very little "forrader." But, at the risk of wearying you, I must ask leave to refer to one or two of the points in your article this week, and to make a further effort to define my position, which, having been to your own satisfaction rendered untenable, you are surprised that I have not already evacuated. First, however, I must express my regret that I have misrepresented you, and my still greater regret that you should have thought me capable of wilfully so doing. It is quite possible for me—or for anyone—to misunderstand an opponent's arguments, or to fail to grasp their true sense. Considering them from a different standpoint, it is an easy thing to do; but failure of comprehension need not, surely, be imputed to one for deliberate unfairness. It appeared to me that the formation of a Trade Union was, in itself, a defensive measure; but I, of course, unreservedly withdrawn my interpretation of your remark.

I myself have evidently failed to make my position understood; for you say that I want to prove that an advanced rate of wages necessarily results in an increased cost of work. My arguments were rather directed against your contention that rates of wages are determined by supply and demand, not really by organization or its absence. My contention is that organization or its absence can help to determine rates of wages. I quite agree that higher wages do not *necessarily* mean dearer work; it entirely depends upon circumstances whether they do or do not. If a rise in wages be given as the result of an agitation, in such a way as to appear to be extorted by fear of a strike ensuing upon refusal, it is certain to mean dearer work. If it be given freely, as the reward of specially good work, it will probably mean higher labour cost; there being obviously a limit to the amount and quality of work that a man can do. In such a case, the labour cost was probably too low before. If an increase in wages be given as an actual inducement to, and dependent upon, special exertions not formerly put forth—as in a profit-sharing scheme—it is pretty certain to be more than saved in working expenses. That is, however, not inconsistent with saying that the labour cost is directly affected by the rate of wage; for, given exactly similar conditions of employment, say, two "South Metropolitan" companies each working a profit-sharing system, the one paying 6s. a day for stokers and the other 8s., it must be admitted that the second Company's labour cost would be greater, even if not proportionately greater, than that of the first.

You ask me to disabuse my mind of the belief that the introduction of the eight-hours shift in the year 1889 (which, you admit, raised the cost of carbonizing) was a triumph for Unionism. Well, I can only again quote Mr. Livesey's statement that, "when the Gas Workers' Union started in 1889, *it* raised the rate per ton," &c. I am well aware that it was declared at the time that the Union was not instrumental in obtaining the change of hours, and that they were only "forcing an open door." But when a man opens a door for fear of its being driven open, he will very likely wish people to believe it was never shut. The fact is, however, that the Union—or at any rate its members—were under the impression that they had been the means of obtaining better terms of pay and hours. They held a meeting in Hyde Park to celebrate their victory; and, as they did not give the Companies any credit for generosity in granting those terms, they worked, if anything, less efficiently after than before. Under such circumstances, higher wages must mean dearer work. The South Metropolitan Gas Company then started to reduce their labour cost, and did so by the use of machinery

and by getting better working from their men through the introduction of the profit-sharing scheme. But now that their men are working probably as well as it is possible for them to work, increased wages would certainly mean increased labour cost. A convincing proof that higher wages necessarily means dearer work, would, as you say, be a terrible check to the elevation of the conditions of the working classes; but the argument that higher wages never means dearer work, would be rather an inconvenient one for employers to advance.

I may, perhaps, be allowed to recall the fact that, in my first letter, I expressly deplored the condition of society in which employers and employed are found ranged in opposing camps; my contention, however, being that the remedy does not lie in any attempted smashing of Trade Unionism, a process which, if temporarily, can never be finally successful. My "good word for Trade Unionism," as you put it (my plea for constructive instead of destructive measures, as I put it), amounts to this—that unless and until employers find a different *modus vivendi*, not by attempting to crush but by superseding Trade Unionism by some scheme for recognizing that mutual interest of men and masters which is so often admitted in theory, but so often forgotten in practice, fierce hitting at Trade Unions on any and every occasion, and the reiterated expression of a belief in their unmitigated evil, their lack of any redeeming benefit to their members, only serves to embitter relations already all too strained.

I should like, Sir, if I have not already trespassed too far upon your space, to quote from Professor Stanley Jevons—who was far from being an admirer of Trade Unionism, and whose authority is so much above mine—an expression of opinion from which I might almost be thought to have derived my own. The quotation is from an essay on "Industrial Partnerships" read in July, 1868, before the Committee on Labour and Capital appointed by the National Association for the Promotion of Social Science. Professor Jevons was pleading the cause of profit-sharing, of which Briggs's Colliery was then the leading case. "I confess," said the writer, "that I cannot myself see the end of the troubles arising out of the contest of capital and labour without some decided change. To overcome or destroy Unions, and achieve peace in that manner, is the desire of some masters. To me, this seems neither desirable nor practicable. Association of some kind or other is alike the sign and means of civilization. In proportion as we become more civilized, Societies and Unions will ever multiply. It is only by substituting one more useful and beneficial form of organization that another can be dissolved; and I think it can be demonstrated that union between each master and his men is the real Union which will be a blessing to all."

You are as firm a believer in profit-sharing as I. Is not its advocacy a more worthy task for so great and influential a paper as the "Journal," than the constant rubbing of a sore, raw enough in truth? The hostility of employers to Trade Unions needs no inflammation.

You have been pleased throughout to assume that I am merely theorizing. I can assure you that I have the actual experience of business friends in my mind in contending that Trade Unions can, and do, bring about higher wages. They know it to their cost. They also know the stupid and irritating restrictions imposed by many of the short-sighted Unions. Those I have never defended. I have expressly argued in favour of admitting that which Trade Unionism can claim, in order the more effectively to criticize its follies, which, I believe, education and experience will do much to remove, and, still better, to hasten its supersession. I shall be very much interested to read the articles to which you refer me.

F. G. N.

Dec. 7, 1899.

A Proposed Garden City.

Sir,—Your article on "Gas and the Working Classes" is indeed a welcome sign of the times. The sentence "Business motives unite with, and re-inforce, the inducement proceeding from politic considerations for administrators of gas undertakings to take an intelligent interest in the development of the great problem of housing the poor," is a notable one; though I think you will agree with me that it might with advantage be translated into yet wider terms, as embracing business of every class. So translated, and with an earnest and resolute endeavour to act upon so statesmanlike a basis, we should at once be within a step, or a clearly-seen series of steps, of a solution of at least three great problems—the housing problem, the agricultural problem, and the problem of how to improve and beautify our existing towns and cities.

Another sentence in the article, like many prophecies, leads directly to its fulfilment. You say: "The administrators of gas undertakings of the great towns are certain to be approached for help and counsel by those ardent philanthropists who are even now dreaming of Garden Cities." Yes; we do, indeed, need the help and counsel of such men, and doubtless should soon have asked it. But, as the author of the book "To-morrow," which has led to the formation of the Garden City Association, I regard your article as a kindly proffer of help, and feel that our wish to receive that help should be expressed at once.

But before you can give us the benefit of your co-operation, you must clearly understand what our plan of action is—a plan involving but a few main principles, with a whole mass of details to be filled in by practical men in the various departments of life. Our proposals involve for their realization the purchase of a large tract of land in an agricultural district—*e.g.*, 6000 acres. On this, we propose to build a new town—a town which shall be a model of all that a town should be, whether regarded from the industrial or from the social side. In order that this result may be achieved, it will be necessary to carefully plan the estate beforehand, so that, as the town grows, it will be found growing up in accordance with a definite design which embraces such essential features as adequate provision of space for homes, for recreation, for schools, public buildings, roads, factories, shops, railways, lighting, water, &c. The particular ground-plan which is to be found in my book, might, under certain circumstances, be a suitable one. But I wish to distinctly disclaim any over-weening confidence in it; and as it would, in many situations, be quite unsuitable, I refrain from going into it here. I do, however, wish to emphasize, as being quite essential to healthy town-growth, the importance of careful forethought in these matters, as opposed to the altogether haphazard growth of most of our existing cities. Having secured our estate, and carefully planned it, manufacturers and others, with whom, of course, we should have been in close consultation beforehand, would come and put up their works on the site; bringing with them their workpeople—for whom, by means of the Housing Section of the Association, and other agencies, adequate provision would be made—and leading to the development of many other industries and callings.

Another essential feature of the scheme must be here introduced. The land would be vested in a body of Trustees, who would hold the same on behalf of the community, which would, in the capacity of landlord, receive all ground-rents, pay thereout interest on the money with which the estate would be purchased, provide a sinking fund, and apply the remainder to such purposes as are elsewhere defrayed out of rates. The result of these arrangements would be that the rate-collecting authority of the district would have but little additional work thrown upon them by the coming to the area of a very considerable population; while the increased annual value would probably prove sufficient to carry on what I may call the "municipal" work of the town.

The question of the kind of tenancy to be granted is, of course, of very great importance; and though we are quite in the discussion stage of this matter, it seems probable the result will be that a system of perpetual leases will be settled upon. It is true that the rent to be paid to the community under the leases would be subject to revision—perhaps quinquennially. But this does not, it seems to me, present any difficulty—I am looking at it now from the manufacturers' point of view—for you will see that the rent revision is only to be *for rating purposes*, and no rates would be levied by the community on the buildings.

It will now be readily perceived that, if a large body of manufacturers come to the town, it will set in motion a vast number of industrial wheels, in some of which the "Journal" is specially interested—those of gas and water undertakings. It is upon these matters that the experts who read your paper could help us; and surely it would interest your readers if you permitted in your columns a discussion of the possibilities to be opened up by a fresh start, and a, so to say, clean sheet. It seems to me that it would be quite possible, between business men, to arrange, as to gas, for a standard price, a standard dividend, a sliding-scale, and terms of purchase by the community, if it were not found practicable at the outset for the "Corporation," as I may term it, to carry out the works on their own account; and I for one can quite see the possible dangers of attempting to cover too wide a field at the start.

You will note that our whole scheme is one of private enterprise. But I hope it will be by private enterprise inspired by a real and effective desire for the public well-being; and I feel confident that among your readers there must be many who would be not only able but anxious to help us in an effort which certainly needs all the concerted wisdom which we can possibly secure. We wish to mobilize a powerful industrial army; and our aim is to ensure at once cohesion and mobility, and to appeal alike to the social and the individual side of men and women.

Garden City Association, 11, *New Court*, *Carey Street*, *W.C.*, *Dec.* 8, 1899. Ebenezer Howard.

The Children of the Late Mr. J. Fryer.

Sir,—We beg to enclose a copy of a circular sent to the members of the Midland Association of Gas Managers, in the hope that its publication may enlist the sympathy and support of a wider circle than is comprised within the limits of our own membership.

Dec. 8, 1899. J. Ferguson Bell, President.
C. Meiklejohn, Hon. Sec.

[Enclosure.]

MIDLAND ASSOCIATION OF GAS MANAGERS.

Dear Sir,—At a meeting of the Committee held on Thursday, Nov. 30, 1899, the following resolution was unanimously passed: "That an appeal be issued to the members of the Association on behalf of the children of the late Mr. James Fryer, of Market Harborough; and that Mr. C. Meiklejohn be appointed Honorary Secretary and Treasurer to the fund."

The facts of the case are peculiarly sad, and will, I am sure, awaken a feeling of deep sympathy from every member of the Association. The late Mr. Fryer, whose wife pre-deceased him only a short time ago, died on Friday, the 27th of October last, and, being a comparatively young man just making his way, had not had time to make provision for his children, of whom there are five—the eldest being a girl of sixteen, and the youngest a boy of four. He was insured for £200; but, dying intestate, this money is not available until the children come of age. Besides this, there was practically nothing for the children; and I trust this appeal will not be made in vain in securing substantial aid on behalf of the education and maintenance of these little ones.—Yours faithfully,

Chas. Meiklejohn.

Rugby, *Dec.* 1, 1899.

[In giving insertion to the foregoing letter and its enclosure, we may state that the late Mr. Fryer was a Mason, and that the Province of Leicester are supporting one of the boys for election to the Freemasons' School. Any votes, therefore, which may be at the disposal of those of our readers who are members of the craft, or assistance rendered by others in any other form, will be welcomed by the Committee of the Midland Association for this very deserving case.—Ed. J. G. L.]

The Visit of Mining Engineers to Smethwick.

Sir,—On p. 1333 of your issue for Nov. 28, you have a paragraph about a visit paid by the North Staffordshire Institute of Mining Engineers first to the works of the New Conveyor Company and afterwards to the Smethwick Gas-Works. In describing the latter portion of the programme, you say: "A feature of the visit was the inspection of the Smethwick Gas-Works, where the Manager (Mr. B. W. Smith) spoke in the highest terms of praise concerning the Company's automatic machinery in use there; the borough possessing the first complete automatic retort-house and coke-conveyor plant in the Midlands." The inference would naturally be that it was the New Conveyor Company's automatic machinery about which Mr. Smith spoke "in the highest terms of praise." I have no doubt that Mr. Smith did speak "in highest

terms of praise" concerning the machinery in use, and the inclined retorts at Smethwick; but as the New Conveyor Company had no more to do with the design or construction of any portion of that machinery than you had, Sir, I think it would only be just if you would kindly correct that portion of your report by saying, in your next issue, that the whole of the plant and machinery of the new retort-house at Smethwick were designed by my firm—Messrs. W. J. Jenkins and Co., of Retford—subject, of course, to Mr. Smith's contract drawings and his approval, and constructed by our workmen in Retford, with the sole exception of the gas-engine and 32 top-end retort mouthpieces, which were specified to be of Tangyes' make. Up to Wednesday, Nov. 29, the New Conveyor Company's coke conveyor had not been finished, nor set to work; so it could not be referred to as being "in use" at the time of the visit.

Retford, Dec. 7, 1899. W. J. JENKINS.

LEGAL INTELLIGENCE.

Compensation to a Workman.

In the Court of Appeal, on the 2nd inst., Lords Justices Smith, Collins, and Williams had before them the case of *Lloyd v. Sugg and Co., Limited*. It was an appeal from a decision of the Judge at the Westminster County Court, where the plaintiff, a smith, aged 67, who had been employed by the defendants, was awarded 15s. per week from Jan. 16 last, in respect of an injury to his hand resulting from the boy who was assisting him at the anvil missing his blow, and striking the handle instead of the head of the tool Lloyd was using, thus jarring his hand. Mr. Spencer Bower, who appeared for the appellants, submitted that, on the evidence, the injury arose from the gouty diathesis of the plaintiff, and not from the blow; or, at any rate, that the injury was not solely caused by the accident, which he submitted was the proper construction of the Act. Mr. Duckworth, for the respondent, was not called upon; the appeal being dismissed, with costs.

The Welsbach Incandescent Litigation.

In the Chancery Division of the High Court of Justice last Tuesday, before Mr. Justice Cozens-Hardy, Mr. Neale (with him Mr. Bousfield, Q.C.) applied that the two actions brought by the Welsbach Incandescent Gas-Light Company, Limited, against the New Incandescent (Sunlight patent) Gas Lighting Company, Limited, and the New Sunlight Incandescent Company, Limited, might not be taken during the present sittings. One action is brought on the 1886 patent, and the other on the 1893 patent; and both have recently been transferred from Mr. Justice Byrne to Mr. Justice Cozens-Hardy for trial. In the action relating to the 1893 patent, the defendants had taken out a summons to administer interrogatories, which were to come before the Court last Saturday; and the defendants would not be in a position to go to trial until they had the answers. In the action as to the 1886 patent, the plaintiffs had administered interrogatories which the defendants had not yet answered. Mr. Moulton, Q.C., for the plaintiffs, did not seriously oppose the application; and his Lordship ordered that the actions should be placed at the bottom of the list, the effect of which will be that they will not come on till after the 11th of January.

Gas Companies' Liabilities.

We learn from "Progressive Age" that a legal case of some importance to gas companies has just been decided by the New York State Courts. In January, 1896, Mrs. Caroline Beyer and her husband occupied apartments on the third floor of a house in the city. Before that date, the Consolidated Gas Company, who supplied the house with gas, had put the connection for a gas-stove into one of Mrs. Beyer's rooms, in compliance with her wish. There had been trouble with the supply to the house; and, at the request of the landlord, two men were sent on the 11th of February to remedy the defect, if possible. It was a very cold day; and just before the men came, Mrs. Beyer lighted the gas in the stove, and lay down in the room where it stood. While she was sleeping, the men who had been sent to clean out the pipes arrived, shut off the gas from the whole house, cut the connection between the pipes in the house and the street main, drew out the water which had obstructed the flow of gas, reconnected the pipes, and turned the gas on again. The gas flowed through the open stove into Mrs. Beyer's room, until she was finally aroused, found herself much affected by the gas she had inhaled, and with difficulty reached the door and called for help. In her action against the Company for damages, evidence was given to show that her injury was serious. The Appellate Division, in an opinion by Justice Rumsey, has affirmed the judgment on the verdict given in favour of the plaintiff at the trial; holding that the Jury were justified in finding that the defendants' servants did not use proper means to warn the plaintiff, and were therefore guilty of negligence.

The Falmouth Corporation and the Water-Works.—At the meeting of the Falmouth Corporation on the 30th ult., it was resolved to appoint a Water-Works Purchase Committee to consider what steps should be taken towards the acquisition of the Falmouth Water Company's Works, and to report from time to time to the Urban Sanitary Authority.

A Large Pipe Contract for Leeds.—One of the minutes submitted by the Water Committee at the meeting of the Leeds City Council last Wednesday was a recommendation to accept a tender of the Stanton Iron-Works Company for the supply of cast-iron pipes for the conveyance of water from Swinsty reservoir to Eccup; the price being £60,972. Mr. Tom Walker objected to the acceptance of the tender, contending that one by another well-known firm would save £3600; and the pipes would be equally good. Mr. Henry supported these remarks. Alderman Cooke, in reply, stated that in this matter the Committee had been guided by their responsible officials; and they had come to the conclusion that there would be less leakages with the pipes of the firm in question. The minute was adopted.

MISCELLANEOUS NEWS.

THE DISPUTE WITH GLASGOW CORPORATION GAS-WORKERS.

The Town Council and the Proposed Conciliation Board.

At a Meeting of the Glasgow Town Council last Thursday—Lord Provost CHISHOLM presiding—the Clerk submitted a memorial addressed to the Gas Committee by the National Union of Gas Workers and General Labourers of Great Britain and Ireland. The memorial, which was signed by Mr. Joseph Burgess, Acting District Secretary, contained proposals for the establishment of a Board of Conciliation and Arbitration for the regulation of wages and working conditions in the departments of Corporation employment under the control and management of the Committee. Mr. Burgess stated that his Executive had drafted suggestions to the effect that the representatives of the employees be two workmen from each of the gas-works at Dalmarnock, Tradeston, and Dawsholm, one from the Street Mains Department, and one official from the staff of the Union; that the Corporation be represented by seven members of the Gas Committee and one official from the Gas Engineer's Department; that the Lord Provost preside over the meetings of the Board; that the Board meet annually to determine the rates of wages and conditions of labour for the subsequent twelve months; and that, in the event of a difference of opinion arising as to the interpretation or faithful performance of the conditions of agreement, either party may call a meeting of the Board on giving fourteen days' notice.

Mr. W. STEVENSON (Sub-Convener of the Gas Committee) moved that the memorial be allowed to lie on the table.

Mr. GRAHAM seconded the motion. He said he did not think, so far as the Gas Committee were concerned, that any of the men who had approached the Gas Engineer or the Committee had suffered in any sense from being concerned with a Trade Union. Even though a Conciliation Board was to be formed, it did not seem to him that it ought to be in connection with this particular Union, the objects of which were almost identical with those of the Independent Labour Party's programme. The memorial should be left on the table. To give it further consideration would be to open up a very serious state of matters. The Glasgow Corporation must take in non-Unionists as well as Unionists, as both were ratepayers. The men were terrorized into joining the Union. At present, owing to a recent episode, the men felt that the incubus of the Union was being taken off their shoulders; and scores of men had approached individual members of the Corporation and the General Manager to ask the Council to refuse to have anything to do with the memorial.

Mr. G. MITCHELL proposed, as an amendment, that the memorial be remitted to the Gas Committee.

Mr. CRONIN seconded the amendment. He admitted that the Gas-Workers' Union was the most advanced in Great Britain; but if it could get on so well as it did with the Corporations of Hull, Leeds, and other cities in England, was there any reason why the same state of things should not prevail with the Corporation of Glasgow? The men were told that if they had any complaint they should go the foreman; but they knew what that meant—it meant dismissal.

Mr. BATTERSBY said the establishment of Boards of Conciliation and Arbitration was such a commendable thing, that it should receive the assistance of every member of the Council.

Bailie FERGUSON expressed the hope that the Council would not take up a position of antagonism to 400,000 men in the city who approved of Trade Unionism.

Bailie KING considered that the Council was a far better Conciliation Board than any that could be formed by the Gas Workers' Union. They did not object to any man joining a Trade Union; but they ought to make it abundantly plain that all who chose might remain outside.

Mr. STEWART stated that, in the Committee, Treasurer Murray put to Mr. Foulis the question which he (Mr. Stewart) now put to the Council: On what principle did Mr. Foulis refuse to see an advocate from the men, who could probably place their position better before him and the Committee, when he knew that every day, in disputes and arbitrations which took place in connection with their large contracts, they admitted an advocate to state the case of the contractors? He was surprised at the attitude taken by Bailie King, who was a member of a Conciliation Board; and there were several other members of the Council who acted with Trade Union officials day after day. One of the District Managers of the Gas Department had said that if he had his own way for three weeks he would not have a Union man inside the gates. Mr. Foulis had a list of names of members of the Union who had been victimized; and these men had been reinstated.

Mr. GRAY said he could not be a party to the memorial being remitted to the Gas Committee. This matter affected all the Corporation departments; and he moved, as a further amendment, that it should be remitted to a Committee consisting of the Conveners of the Standing Committees of the Council.

Mr. PRIMROSE, in seconding Mr. Gray's proposal, said that if Conciliation Boards were to be of value, they must be applied equally to all the employing departments.

Mr. PATON supported Mr. Stevenson's motion. He said he thought that to make the question general would be even worse than to send it to the Gas Committee. Every workman in the employment of the Corporation should be at perfect liberty to join a Trade Union if he chose. The Committee had taken up the right position. Considering the danger that the streets might be left in absolute darkness on account of what the men might do, the Committee and the General Manager had acted wisely in arranging that the men who wished should be engaged for six or twelve months; and he thought that anything which would do away with this was very much to be deprecated. The position he had always taken up was that if the workmen had any reasonable fault to find with the general conditions of labour, they should appoint a deputation to go to the particular Committee to discuss the matter. He had never in all his experience learned that any Committee of the Corporation had declined to meet a representative of the workers regarding the conditions of labour. Personally, he would not allow outside parties to come in to interfere in a matter which they were perfectly able to settle themselves.

Bailie W. F. ANDERSON said he could not agree to allow an outside

Association, to whose objects, as laid down in their rules, he was fundamentally opposed, to come between them and their workers. He saw no objection, however, to the Gas Committee, in the near future, considering the question of the formation of a Board of Conciliation by their own workers.

On a division, the motion was carried; the voting being: For the motion, 41; for Mr. Mitchell's amendment, 22; and for Mr. Gray's amendment, 5.

The District Secretary of the Union on the Discussion.

The "Glasgow Herald" last Friday contained a long letter by Mr. Burgess, dealing with the discussion in the Council. He said the debate appeared to him to be absolutely irrelevant to the subject at issue. The Gas-Workers' Union sent in certain proposals for the formation of a Board of Conciliation and Arbitration. There was no case presented why such a Board ought not to be formed; and the Councillors who spoke against the proposals followed the time-honoured maxim of those who have no case—"Abuse the plaintiff." Three points came up again and again. First, the question of the London Executive of the Union having control and decreeing a strike of Corporation employees in Glasgow. He pointed out that the London Executive was a "steadying force;" it never initiated strikes. It sat as a court of appeal; and before a district could enter upon a strike, it had to satisfy the Executive that there was no alternative course open, if justice was to be done. In every case where the alternative between a strike and a reference to a Board of Conciliation was open, the Executive would be in favour of conciliation. Secondly, a great deal had been said about the Union being a socialistic organization. This is founded on Object 10: "To secure the return of members of the Union to Vestries, School Boards, Boards of Guardians, Municipal Bodies, and to Parliament; providing such candidates are pledged to the collective ownership of the means of production, distribution, and exchange." So far as the return of members of the Union to public bodies was concerned, there was no difference between it and any other Union. All Trade Unions were anxious to see their officials on public bodies; and the Gas Workers' Union had a special interest in this question. The majority of its members were employees of public bodies; and it was easy to understand how important it was that members should obtain seats on such bodies. This principle had been endorsed by the Trades Union Congress year after year; and it was purely special pleading on the part of enemies of Trade Unionism in the Council to say that while they might be prepared to negotiate with the officials of an ordinary Trade Union, they would have nothing to do with the Gas-Workers' Union, because it was socialistic. But what, asked Mr. Burgess, had all these objections to do with the main proposal which came before the Council, which was to form a Conciliation Board? This was in accordance with Object 7 of the Union, which was "to settle all labour disputes by amicable agreement whenever possible." Was that a good and laudable object? This was carefully passed over, and attention concentrated on Object 6: "To abolish the present system of contracts and agreements between employers and employed." Exactly, "the present system," not contracts and agreements altogether. "The present system," continued Mr. Burgess, "as practised in Glasgow, and in no other British corporation, signs on men for varying periods; the object being to prevent them making a collective bargain with their employers. This is openly confessed, and it is a breach of the foundation principle of Trade Unionism; and all Trade Unionists in Glasgow will rally round the Gas-Workers' Union and demand that the system be abandoned. In its place, we offer a yearly contract, with a two-months' notice; and if the Corporation of Glasgow cannot ensure a continuity of gas supply under such conditions, then it must be because there is something seriously wrong with the management. Upon this point the issue is joined; upon this point the battle on our side will be fought."

THE GAS-WORKERS' AGITATION AT HALIFAX.

Following up the decision of the Halifax Gas-Works employees noted last week, p. 1380, the Halifax Town Council on Wednesday had the matter under consideration at their usual monthly meeting.

Mr. James Parker commenced the proceedings by moving that the following resolution, passed in May, be rescinded: "The Gas Committee declines to make a new departure which would involve the interference by third parties; but, on the contrary, reaffirms its existing practice of fully considering every application presented to it by the men through the authorized channel of the Engineer and Manager of the gas-works." The employees at the gas-works, he said, by an overwhelming majority, had declared that they wished to make their wants and requirements known through their Union, which was an all-sufficient justification for the resolution.

Alderman Woodhead, in asking the Council to negative the resolution as altogether unnecessary, stated that the Gas Committee were considering the question. They were fully alive to everything that was taking place, or that might take place; and a proposition to supersede the resolution on their books by something else ought to come from the Committee itself. The matter should have been left to be dealt with by the Committee. Anything they decided upon in connection with the workmen, financially or otherwise, would date from the time the decision was come to, subject to the approval of the Council.

Mr. Whitley looked upon the resolution as simply a formality. The Gas Committee, on his proposition, had held a ballot of the employees at the gas-works, to see whether they did desire to have their negotiations with the Committee conducted through officials of the Union. This had been shown; and the Committee, very properly, at their last meeting, decided to ask a deputation from the Union to attend at their next meeting. He hoped that the Council would look upon the matter as a mere formality.

Alderman Spencer maintained that the decision of the Committee to receive the deputation was transgressing, in a most flagrant manner, an order of the Council, which forbade their treating with the men through any but *bona-fide* employees. To ballot the men was a strange policy for the Committee to carry out without the sanction of the Council. Seeing, however, that the ballot had been taken, and that the men had given the decisive answer they had, the resolution standing on their books was clearly knocked on the head. The only consistent course, therefore, for the Council to take was to remove it from the books, and to carry out the policy which the Committee had inaugurated.

The resolution, on being submitted to the meeting, was carried by 26 votes to 16.

Mr. Parker thereupon moved: "That a special meeting of the Gas-Works and Electricity Committee be called to receive the deputation appointed by the Gas Workers' Union, and to consider the requisition put forward by the Union on behalf of the employees at the gas-works." His motion, he stated, was a motion of peace, and had been brought forward to stop the possibility of any dispute at the gas-works. He was aware, after two years' experience on the Council, that it was not the custom of the Council to interfere with Committees; and in the main, this might be a wise custom. But it was not always wise. The Council was the paramount authority; and, as the paramount authority, it should have the right to say to any smaller body what that smaller body should do. He claimed that the Gas Committee had dallied with this question. They, might, if they had wished for a settlement, have arrived at one long ago. The policy of the Committee and the Chairman of the Committee had been a policy of "put off" all along the line. There was no reason why, when the result of the ballot was made known, they should not have brought the application of the men contained in their requisition to an issue one way or another. There was everything to gain by calling the Committee together to deal with the requisition at once. The requisition, they had been informed, was to be dealt with at the ordinary meeting of the Committee next Wednesday (to-morrow). With a long *agenda* of Committee business, however, to attend to, there was a danger that they would not have time to deal with it properly. Alderman Woodhead had asserted that he knew all that the men had done; and the men, on their part, were acquainted with every move that the Gas Committee had taken. His proposition was not a setting of one against the other, but a motion for a humane and sensible settlement of the question; and the Gas Committee had nothing whatever to lose by accepting it.

Mr. Crossland, in seconding the resolution, trusted that the requisition would be dealt with, not for glory or victory, but on the principles of right and justice.

Alderman Woodhead remarked that what they all wanted was peace at the gas-works. The Committee, at their meeting last week, fully discussed this question of receiving a deputation on behalf of the men; and he (as Chairman) was willing that a day should be set apart which would accommodate the great majority of the Committee. It was very necessary, he thought, that the great majority should be present. After discussion, it was found that many of the members would be unable to attend before next Wednesday, and the reception of the deputation was accordingly fixed for that day. To ask the Council to instruct the Committee which had the question under full consideration to fix a special day, was going a little bit too far.

Alderman Spencer stated that if, after the explanations given, Mr. Parker did not withdraw his resolution, he should be very much astonished.

Mr. Morley believed that the bulk of the Committee were prepared to meet earlier than next Wednesday; and that this earlier meeting could have been called, had there been a willingness on the part of the Convener of the Committee meetings to call it. He maintained that it was impossible for the Committee to do justice to the requisition from the workers along with the routine business of an ordinary meeting. In all fairness, therefore, the Council ought to bring pressure to bear, and say that a special meeting for the consideration of this special business must be called. The requisition had already been shelved for ten weeks; and he must confess that the whole action of the Committee, so far as he had known it, had appeared to him to be one of whipping the men into antagonism.

Mr. Whitley explained that it had been arranged that, at the meeting on Wednesday, the requisition from the gas workers should come on first. The length of the Committee's agenda, therefore, did not affect the matter in the slightest. There was a delay of a week in the taking of the ballot of the men owing to Mr. Morley himself. The taking of the ballot was, he considered, a right policy to adopt, as, if the majority of the men wished to be represented by the man in the moon, they had a right to say so. The men had shown that they desired to be represented in their dealings with the Committee by officials of their Union; and the Committee, therefore, had decided to hear what evidence these officials had to place before them in support of the men's requisition. At the present moment, the onus of proof rested, not on the Gas Committee, but on the men's representatives. The Committee believed that they were paying at their gas-works wages equal to the average of the best gas-works in the North of England. They had figures which, they believed, proved that this was the fact. If, however, it could be shown that they were not paying equal to the average of the best gas-works in the North of England, the Committee would be only too willing to make the alteration which would cause this to be a fact. They were anxious that their gas-works should be in the front rank both as to wages and conditions.

Mr. Morley explained that the delay in taking the ballot was due to his insisting that the men particularly affected by the requisition should be ballotted separately.

The Mayor stated that, during the seventeen years he had been a member of the Gas Committee, they had always endeavoured to do their duty properly between the ratepayers and their workpeople, and to pay them every penny of wages that they deserved.

Mr. Parker, replying on the discussion, remarked that with regard to the wages paid to the men, figures would be furnished to the Committee on their behalf, giving the wages paid in other towns, which would be specially mentioned. He submitted that figures of this kind were more reliable than those published by the Gas Committee, where the towns were referred to as A, B, C, or D. His own belief was that the figures upon which the Committee had been relying would be proved to be wrong.

The resolution was then rejected by 44 votes to 3; and consequently the Committee meet to-morrow to consider the matter.

BIRMINGHAM CORPORATION GAS SUPPLY.

The Gas Committee's Interim Report.

The half-yearly report of the Gas Committee was submitted at the meeting of the Birmingham City Council last Tuesday.

Its adoption was moved by Mr. J. H. Lloyd, who remarked that it showed steady progress; the increase in the consumption for the half-year having been above 100 million cubic feet, or nearly 5½ per cent., as compared with the corresponding six months of last year. Good trade had continued in the district; and the prosperity had been the cause of some of their anxieties, because they had not only had to pay a large sum for supplies, but there were many disappointments in the delivery of material for the works and mains. The new large holder was now in working order; and its completion would avoid undue anxiety during the coming winter. The prepayment meters presented an increase of 3138; making the total number now fixed 7938. There was also an increase in the number of cooking and heating stoves hired and sold; and the success of these experiments had induced the Committee to deal in a similar manner with small gas-engines. It was proposed to supply the engines on the three years' purchase system; the opinion being that they would be extremely useful for small shopkeepers and others where a small amount of power only was required. The war in South Africa had affected the department. Twenty-two reservists had been recalled to the Colours; and the Committee felt that the Council would wish that the men should be dealt with on a liberal scale. The Committee had therefore decided to make allowances of from 3s. to 8s. 6d. per week to the wives and families of the men during their absence. The allowances depended upon the number of persons in each family; and at present no grant had exceeded 5s. 6d. per week.

The resolution having been seconded, Mr. Marsh expressed his disapproval of the Committee entering into the business of supplying small-power gas-engines. It was not fair to the manufacturers. Mr. Rogers, on the contrary, thought it would stimulate the sale of gas. Alderman Ash complained of the bad quality of the gas at Saltley, and also of the smoke and smell from the gas-works. He said that the nuisance arising from the gas-works and the sewage farm made the district of Saltley very undesirable to live in. Mr. Johnson also asserted that the gas was poor in quality; but Mr. Stevens thought that the effect of this statement was far too sweeping. His own belief was that defective fittings were often largely responsible for miserably dim lights. Mr. Adie considered that the trading by the Corporation in small-power gas-engines was unfair competition. Mr. Lancaster pointed out, however, that the engines were made by various manufacturers, and that the Committee would simply make provision for their sale. In his judgment, the arrangement was a satisfactory one. Mr. Walthall maintained that, if Mr. Stevens's suggestion could be accepted, the gas-fittings must be bad all over the city. Mr. Toller urged that the distribution of the gas was bad, and illustrated this by stating that on several occasions he had not been able to get sufficient to light a little stove. No gas-works created more nuisance. (This remark was questioned.) Mr. Lloyd, in reply, said there were few firms who made small-power gas-engines; and the outside limit would be fixed at 3 or 4 horse power. The Committee would be willing to try gas-engines sent in by any makers for their inspection. They did not desire to make profit out of the engines; the idea was simply to extend the use of gas in a way which fairly fell within the province of the Corporation. He thought they must congratulate the Public Works Committee upon the use and extension of the incandescent light. The Committee would endeavour to mitigate as far as possible the smells at the works.

The report was adopted.

HARASSING THE GAS ENGINEER AT STOCKTON.

The Confidence of the Council in Mr. Ford.

A curious scene was witnessed in the Stockton Town Council last Tuesday; and though such occurrences (which are happily rare) are to be deplored, it brought out distinctly above all else that the Gas Engineer, Mr. W. Ford, possesses the almost solid confidence of the Council. We use the word "almost" because there are apparently two or three members who do not feel the same respect for, or, perhaps it would be better to say, are not so amicably disposed towards, Mr. Ford as are the remainder of the large body of councillors. That he has so few opponents in the Council is something of which Mr. Ford may be proud. But reading between the lines of the report of last Tuesday's proceedings, it would seem that he is now and again subjected to petty annoyances by those members, who would, if they could, usurp the authority which is his right as the Corporation Gas Engineer and Manager. Mr. Ford, however, has stood firm against such a trespass on his position; and he is upheld, and properly so, by nearly the whole of the Council.

The incident at last Tuesday's meeting arose on the presentation of the minutes of the Gas Committee. Mr. Meggeson called attention to an account from Mr. C. Vasey Brown, the Consulting Electrical Engineer, for expenses amounting to £14 11s. 3d., and said there was something "suspicious" about it. He then went on to allude to a visit which he had paid to the gas-works to examine the books, and also to see a workman named Lloyd, who, he alleged, had been trying to damage his character by spreading reports about him at the gas-works. While talking to the man, he asserted that he was interfered with by the Gas Manager, who got hold of him, and was going to put him outside the works, threatening at the same time to call in two policemen. The Manager, however, ultimately consented to have the men, whose names he gave him, brought into his office; and the men then admitted that the report had been spread. The Manager, indeed, said it was possible he had spread the report; and moreover that he (Mr. Meggeson) had come to upset his authority exactly as Mr. Samuel did years ago, and which it took him years to get back. He would not have mentioned the matter but for the fact that the Manager brought it before the Gas Committee. Interposing, Mr. R. Appleton questioned whether Mr. Meggeson was in order in introducing a personal matter on a suggestion about some wages, and said he might have introduced it at the Gas Committee. This provoked a little scene, in the course of which the Town Clerk said he presumed that Mr. Meggeson was going to move an amendment. Mr. Meggeson admitted that he was; at the same time indicating that he was not going to brook interference by the Town Clerk. As an amendment, and "for the sake of testing the meeting," he moved that the salary of the Manager be referred back, and also that the account of Mr. Vasey Brown should be sent back. Alderman Bainbridge, who seconded, stated that he went with Mr. Meggeson to the works, expecting to see certain books; but they were refused permission. He went on to allege that the management at the gas-works was topsy-turvey; and the Committee were either afraid or not able to do their work.

The first member to speak on the other side was Alderman Nelson, who thought the time had come when the Council should do something to put a stop to this harassing of the Gas Manager. He was a gentleman who had been with them, he believed, for some 35 years; and he had, he was sure, the confidence not only of the Committee, but of the town. Why he should be harassed in this matter was beyond comprehension, and painful to contemplate. No single member of the Council, not even a member of the Gas Committee, had any business to go into the gas-works and demand to see the books of the Manager; so that neither Mr. Meggeson nor Alderman Bainbridge had any business there. The Gas Committee were capable of managing their own affairs, and were managing them satisfactorily and for the benefit of the town. Alderman Samuel, M.P., expressed surprise at the statement, on the authority of the Gas Manager, that he had interfered with his authority. He had never, to his recollection, visited the gas-works except in his capacity as a member of the Sub-Visiting Committee. [The Mayor here intimated that he could accept the amendment with regard to Mr. Vasey Brown's account, but not with regard to the Manager's salary, as it was due under contract.] Alderman Cameron agreed that it was very undesirable on the part of any member of the Corporation to harass the Manager in his duty at the gas-works. Mr. Meggeson desired that Alderman Cameron should withdraw the insinuation that he was harassing the Gas Manager. The Mayor: He said it was very undesirable that any man should try to harass the Gas Manager. Alderman Cameron considered that "harassing" was the best word he could use to express what he thought. This expression of opinion was greeted with cries of "Hear, hear." Mr. Green went a bit stronger than the last speaker in saying it struck him very forcibly that a new sport had arisen —that of baiting Corporation officials. The Mayor, replying to a question, said if any member wanted to go down to the gas-works he could do so by obtaining permission from the Gas Committee. Mr. Appleton also spoke in defence of Mr. Ford; among other remarks saying that the Manager had been harassed times out of number in that chamber; and now it appeared the war was being carried into Mr. Ford's own domain. He hoped the vote that night would be treated as a vote of confidence or want of confidence in Mr. Ford.

Invited by the Mayor, Mr. Ford addressed the Council; and, in rising, he was heartily applauded. He said the facts were these: Mr. Meggeson went down to the cashier's office at the works, and asked for the man Lloyd, demanding also certain books and information. He (Mr. Ford) happened to be passing the window; and he went in and courteously asked what was the matter. Mr. Meggeson at once said "I am here to hold an inquiry; you go out of the office." [Mr. Meggeson denied this.] Proceeding, Mr. Ford said that Mr. Meggeson asked him to go out, saying "I am your master here; and I shall hold this inquiry as I think fit." He had two witnesses to prove this. He had tried to work in harmony with Mr. Meggeson from the day he entered the Council; but he seemed to have some bias against him. He offered to call the men he desired to see before him in his private office; but he would not allow him to go through the works. The statement with regard to his remark about Alderman Samuel having before interfered with him was not true. He might have said that the men had appealed to Alderman Samuel, and that gentleman had then advised him not to do as he was doing. Mr. Meggeson: Did you say that it took you years to get your authority back? Mr. Ford: Yes, I did; but I did not say that Alderman Samuel took it away.

The amendment, as modified, was then put to the vote. While this was being done, Mr. Ford was observed to be staggering in a fainting condition to the door of the Council Chamber. Here he would have fallen but for the assistance of the Town Sergeant and one or two of the members who helped him outside, where he fainted away. Dr. Densham was called out of the chamber; but Mr. Ford soon so far revived as to be able to be removed home in a cab. The incident created a painful impression. While Mr. Ford was being attended to, the vote was taken, and Mr. Meggeson's amendment was rejected by 28 votes to 3.

AN ADVOCATE FOR THE MUNICIPALIZATION OF THE GAS AND WATER WORKS AT BRISTOL.

A vote by the Bristol Town Council, sanctioning the expenditure of more than half-a-million of money on a comprehensive sewage scheme, has suggested the subject for an article by a contributor to the "Bristol Times." This new undertaking means an addition to the rates of 4d. in the pound; and the writer considers the ways and means whereby the burden, and other imposts to come, may be met without falling direct on to the shoulders of the ratepayers. Without hesitation, he advances the definite proposition that "this can be done by the Municipality taking over the water-works and the gas-works, and applying the ever-increasing revenue of these two continually expanding concerns to the relief of the rates." He says he is aware that negotiations for the acquisition of the water-works have long been pending; and, he concludes from the fact that nothing has come of them, that apathy, vested interests, the enormous price asked, and determination on the part of the proprietors of that concern not to part with their valuable property, if they can help it, are the hindrances. Seemingly, he continues, a certain section of the members of the Bristol Town Council have such narrow views that they cannot comprehend big questions, and the expenditure of a large sum of money frightens them. They are impressed with the notion that the outlay of a million, on whatever it may be, is expenditure which must be made up by increasing the rates, instead of being an investment, the revenue from which may not only pay the interest on the borrowed money, and the capital, too, in time, but yield a considerable profit, which may be applied to lightening the

burdens of the citizens. He is quite convinced that, unless this latter view of civic expenditure is taken by the large majority of the Council—unless some spirit of enterprise is manifested—great and general improvements will never be made in the city. The writer then proceeds to inform his readers of what Mr. Chamberlain was instrumental in accomplishing for Birmingham by the energy and determination with which he took up the question of the municipalization of the gas and water interests of the city, and gives a few statistics as to municipally-managed industries in other large centres—winding up with the injunction to the Bristol councillors to "go and do likewise."

HUGE OVER-CAPITALIZATION OF THE SHEFFIELD ELECTRICITY UNDERTAKING.

Extracts from an Article in the "Sheffield Independent"—The Price of Electricity Must More Nearly Approach that of Gas.

It is nearly a year since the Corporation purchased and took over the management of the Sheffield Electric Light Works, and during that period neither the public nor the City Council have heard a great deal about the condition and prospects of the undertaking; the contrast between their scanty information on this subject and the complete confidence extended to the Council and the public by Alderman Clegg in regard to the working of the newly-municipalized tramway system being most remarkable. Information which has reached us suggests that the Electric Light Committee have from the first been confronted with the difficulty of carrying on remuneratively an undertaking which is largely over-capitalized, and that they are still grappling with the problem thus set. According to the General Manager (Mr. William Johnson), the business showed a satisfactory development during the first half of this year; and this development is no doubt still continuing. But the Committee have evidently felt with Mr. Johnson that the progress made, though satisfactory in proportion to the whole amount of business hitherto done, does not show any prospect, if continued only at the same rate, of establishing the undertaking on a sound financial basis within a reasonable period. Progress, to be adequate, must be so extensive that the dead-weight of interest and sinking fund on the vast increase of capital which went to the bought-out Company in the shape of premium (amounting altogether to over £140,000) shall be more than counterbalanced. To devise a means of securing such progress is no light task. Almost the first act of the Committee, however, in assuming the direction of the undertaking, seems to have been to ascertain exactly how it stood financially; and a lengthy report on this question was prepared on their instructions by Mr. Johnson. Not satisfied with this, the Committee requested their Manager to consult with Mr. Robert Hammond on the broad question of whether there was any system for the supply and distribution of electricity which would be more advantageous to Sheffield than the one now in operation, or whether any modification of the existing system was advisable and practicable, "having regard," in either case, "to the capital expenditure already incurred, and to all other circumstances of the case." The consultation resulted in the production of a long report by Mr. Hammond, in which he made important suggestions for the modification of the system, both of generation and of distribution, now in use, and advised the inclusion of outlying districts within the area of supply. Mr. Hammond's most important suggestions were severely criticized by Mr. Johnson; but Mr. Hammond fully maintained his ground in a rejoinder. There for the present matters stand.

The progress of the business on its present basis is, as stated, fairly satisfactory. Mr. Johnson, in his report for the half year ending June 30, says that during that period new orders were received to connect an equivalent of 21,787 8-candle power lamps to the supply mains, an increase of 29½ per cent. upon the lamp connection as it stood on Dec. 31, 1898, when the Corporation assumed the control; and 439,316 units of current were metered during twenty-four weeks, an increase of 31·7 per cent. The receipts for the sale of current were £8991, an increase of 17 per cent., notwithstanding that, in the first three months of 1898, the charge per unit was 5d., instead of 4d. as since March 31 last year. The engine-room and distributing costs, exclusive of establishment charges, were 0·95d. per unit for the twenty-four weeks, against 0·93d. for the corresponding period of 1898. An advance in the price of coal had had the effect of counterbalancing certain reductions made in other directions, and of slightly raising the total cost.

An important statement of fundamental facts as to the finance of the undertaking, as contained in a report by Mr. Johnson to the Committee, is next presented as follows: "(1) The purchase of the electric light undertaking from the late Company added £143,685 in the way of premium to the capital account. (2) The enlargement of the capital account has not assisted the Corporation to earn any additional revenue. (3) An annual payment of £6216 has to be made on account of interest and sinking fund on the amount of the premium for 40 years. (4) The annual payment of £6216 is, of course, in addition to the interest and sinking fund on that part of the capital which may be said to be represented by assets, and is also in addition to the interest and sinking fund which will accrue on all further capital expenditure. (5) When the Corporation agreed to the payment of the above-mentioned premium, the sale price of current was 5d. per unit. The sale price of current now averages 3·87d. per unit. (6) Owing to the addition of the premium, the annual income from the undertaking is not sufficient to meet the annual payments, and the deficit on the current year's working may be £3000. (7) In the absence of the premium and its annual payment for interest and sinking fund, the surplus of the income over expenditure for the current year would have been sufficient to provide 6 per cent. to 7 per cent. on the remainder of the capital involved in the undertaking." Mr. Johnson proceeds: "I wish to make it absolutely clear to the Committee that the deficit on the year's working is due entirely to excessive capitalization, and not to any sluggishness or want of progression within the department; indeed, the undertaking continues to be remarkably progressive." But the Committee will be unable to present a healthy return to the ratepayers for a considerable period unless the department receives some assistance.

If the Corporation were just commencing electric light operations with a clear field, they would undoubtedly be advised to do what other Corporations have done—viz., to become consumers, as well as suppliers, of electricity, and to consume their own production as largely as possible. Even now, all Corporation departments should, wherever possible, substitute the use of electric light in place of gaslight. Street lighting, for instance, by electricity would occupy the machinery at the generating station remuneratively during many hours when current would not otherwise be in demand, and very necessary is this maintenance of the demand for an undertaking "which has become overwhelmed with financial obligations." The sale price of the current, Mr. Johnson points out, is the *crux* of the whole matter. The lower the sale price, the greater the sale; the greater the sale, the cheaper, within limits, can current be produced. At present, *with current at 4d. per unit, its cost does not compare favourably with that of gas;* and there will be an absence of buoyancy until the sale price of current has been reduced. No method of endeavouring to persuade the general public to become consumers of electricity will succeed, except that of *making the price of current approach more nearly to the price of gas.* Nevertheless, the reduction must be approached with great caution and by stages. To reduce the sale price before the profits are reasonably sufficient to meet all the annual charges connected with the undertaking, would be too great a risk; and it is with the object of increasing the income that the General Manager submits to the Committee the desirability of soliciting the cordial assistance of other Committees of the Corporation; so that the undertaking may be more quickly placed on a sound basis, and so that the Corporation may derive permanent and substantial satisfaction from the purchase of the undertaking. He suggests accordingly that a considerable fresh demand may be obtained for electric lighting from street-lamps, public baths, shambles, free libraries, open markets, and the Corn Exchange buildings.

Concerning the controversy between the experts, after an exhaustive examination of the position of the undertaking, Mr. Hammond thus summarizes his recommendations for improving its prospects: "(1) That in view of the present large capital expenditure, and the amount of interest and sinking fund payable thereon annually, it would be unwise to make any complete change in the system of supply. (2) That on the whole that system can be relied upon to give an efficient and economical service. (3) That the direction in which future economies can be effected is in cessation of expenditure on further alternating plant, and the feeding of the central district by low-pressure continuous currents. (4) That in all extensions of the low-pressure distributing systems, whether alternating or continuous, the three-wire system should be adopted. (5) That it would be an advantage to the undertaking to obtain powers to supply any fairly contiguous districts lying outside the borough, where a good demand for electrical energy could be relied upon." In his reply to Mr. Hammond's suggestions, Mr. Johnson entirely controverts the operative recommendation No. 3, proposing the substitution of continuous for alternating current for the central area of supply; recommendation No. 5 he does not discuss at all. On the contrary, he recommends the Committee "to run the existing station and its machinery for all it is worth, and for as long as it is possible to do so." The new machinery should be called upon to extract the undertaking out of its serious debts and responsibilities, and to create a surplus fund for the supplementary station which will one day become necessary, as the present site is already fully occupied. Only when the financial stability of the undertaking has been completely assured, ought there, in Mr. Johnson's opinion, to be any experimenting with the direct-current system in the central area. Mr. Hammond has a rejoinder, in which he accuses Mr. Johnson of having "completely misread" his report, holds firmly by all his suggestions, and claims to take by far the rosier view of the prospects of the undertaking.

ELECTRIC LIGHTING NOTES.

A proposed loan of £15,300 for land required for the electric lighting undertaking was the subject of a Local Government Board inquiry at Bristol last Tuesday.

The Sutton Coldfield Town Council have decided that the work of electric lighting in the borough shall be proceeded with; and the Electric Lighting Committee have been authorized to obtain professional assistance in the matter.

At Cheltenham, the premises of 346 customers have been connected with the electrical system, representing about 21,800 eight-candle power lamps. Still other applications have been sent in; and a further loan of £17,500 is to be applied for.

The total number of lamps now connected to the Colchester Corporation electrical system is equivalent to 4347 8-candle power lights. The Electricity Committee are now considering the question of entering into an agreement with a free-wiring company.

The electric lighting works of the Hereford Corporation are to be formally opened on Thursday. The Committee in charge have reported to the Council that the encouragement already given justifies them in making several extensions to the mains as originally laid.

The "Birmingham Gazette" announces that the doors of the new Imperial Theatre, Bordesley, remained closed on Monday evening last week, and "Skipped by the Light of the Moon," a two-act musical comedy, could not be presented, owing to the breakdown of the electric lighting plant.

The constant failures of the electric light in Cardiff are subjecting the Corporation Electric Lighting Committee to the ridicule of the town. So says Mr. Fox, who is a member, and who consequently ought to know. But the Committee have had enough of it, and are going to carry their investigations a little deeper than they have hitherto done.

The Llanelly District Council yesterday week approved of the scheme for electric lighting and traction for the town and district; and an agreement was sealed with the British Insulated Wire Company. The work is likely to cost £80,000. The lighting installation is to be completed within twelve months; and traction is to be provided in three years.

There has been opposition to a proposed transference of the Electric Lighting Provisional Order of the Garston District Council to a locally-formed Electric Lighting Company but it has now been withdrawn. It is hoped that the consent of the Board of Trade to the transfer will be obtained at an early date; and if this proves correct, the work will be immediately proceeded with.

Owing to an outbreak of fire in the main conduit, and the consequent fusing of the electric light wires, Copenhagen was plunged into darkness half an hour after midnight on Monday last week. The fire was extinguished within an hour; but it was expected that the light would not be restored for several days. Considerable inconvenience was caused, and work had to be suspended in several of the newspaper printing offices.

The Bath Corporation are "progressing backwards" in respect of the financial condition of their electric lighting undertaking. The Committee who have the care of this unsuccessful venture received a report last Wednesday from Mr. W. Jeffery, Accountant, relating to the six months from March to September. The income showed an increase of £111, compared with the same period of 1898. Mr. Jeffery expected that the accounts for the year would show a deficiency of £1500; and Mr. Bush stated that there was a deficit of £1300 or £1400 on last year. Altogether a 2½d. rate would be required to clear this off.

At the meeting of the Torquay Town Council last Tuesday, the Electric Lighting Committee reported at some length on the receipt of the letter from the Local Government Board relative to the loan. Out of the £10,000 applied for, £7145 was sanctioned; and the Board above asked for additional detailed information and explanation respecting the excess of expenditure over the original loan for the works. The Town Clerk (Mr. F. S. Hex) reported that, having to be in London on the business of the Corporation on the 13th of November, he took the Local Government Board's letter with him to obtain from Mr. Trentham the information required. Mr. Trentham had since supplied the particulars; and they had been forwarded to the Board, as also a further explanation with reference to the item of £200 disallowed for rectifiers.

Yet another unfortunate experience! About seven o'clock on the evening of last Saturday week—the busiest hours of all among the inhabitants of Shrewsbury—there was a stoppage in the city of the supply of electric light, which is not only largely used by local tradesmen, but is also partly used to illuminate the principal thoroughfares. Many of the shops were not provided with gas; and it was found necessary to substitute candles and oil-lamps for the purpose of carrying on business. The service was not resumed until the following day. It appears (according to a reporter) that the "incident" was due to an underground suction-pipe, of which there was no duplicate, suddenly failing, interrupting the feed of water to the boiler, so that there was no alternative but to shut down the machinery and switch off the light.

Truly marvellous are the manifold mishaps that befall electricity works! "What appears," says a Liverpool contemporary, "to be an extraordinary fire has been prevailing at the Chester electric light works. A few nights ago a large mass of concrete, 81 feet deep, supporting two boilers, was discovered burning; and the substance became red-hot. Every effort had in vain been put forward to extinguish the fire. The experts have pronounced the cause as spontaneous combustion; but Mr. Thursfield, the Manager of the works, now considers the cause will not be satisfactorily ascertained until the affair has been more thoroughly investigated. It has become necessary to have the two boilers removed; and yesterday afternoon [Tuesday] the concrete was reported to be still burning. It is feared that, if the fire spreads to the concrete surrounding the other boilers, the city might be deprived to some extent of the electric light for a short time."

Just before seven o'clock last Wednesday evening, an accident of a rather serious nature occurred in one of the transformer sub-stations of the City of London Electric Lighting Company, causing a failure of supply in the whole eastern district of their area. According to the "Electrician," the cut-out controlling one of the transformers had fused badly, failing to clear the contacts, and causing an arc. The arc spread to adjacent mains, and short-circuited them. Eventually it burned free, but not before the whole of the transformer sub-station was filled with smoke. Eight out of the 22 sub-stations belonging to the Company were affected by the short-circuit; causing a stoppage of supply varying from 10 to 40 minutes. The accident was soon localized, and the repair of the sub-station was promptly put in hand. The fuses, cut-outs, mains, instruments, &c., were all replaced by Thursday morning; the Company's staff showing their usual activity (engendered, our contemporary fears, by hard experience) in dealing with breakdowns. It is stated that the type of cut-out which caused the trouble is one that is no longer being employed by the Company.

Last Wednesday, the Salford Town Council had submitted to them a resolution approving of plans and estimates for the whole of the machinery, plant, and distributing mains in connection with the new electricity generating station, amounting to £335,783 (including the sum of £87,200 for the provision of dynamos and boilers already applied for), and sanctioning an application to the Local Government Board for power to borrow this sum. Mr. Haworth, the Chairman of the Electricity Committee, said that, in order to expedite matters, the Local Government Board had promised to hold an inquiry into the matter within a week in the event of the resolution being adopted. The electric trams were expected to be running seventeen months hence; and this being so, it was important to proceed simultaneously with the erection of the buildings and the provision of the plant. A good plot of land in Pendleton, bounded on one side by the railway and on the other side by the canal, had been obtained from the Highways Committee of the Corporation. The present generating station was of 660-horse power, and the new one would be of 10,000-horse power. A sum of about £95,000 had been already spent; and the expenditure now contemplated was about £400,000. This included the cost of the provision of arc lamps for street lighting; but the Lighting Committee had not yet decided whether they would adopt this method of lighting. The existing generating station was really earning a profit at the present time; and he believed that the work now in contemplation would result in a handsome balance of profit to the ratepayers. The motion was unanimously adopted. It was further resolved that application be made for power to borrow £50,000 for the erection of the buildings required for the new station.

A Local Government Board inquiry was held at the Town Hall, Eastbourne, last Thursday, by Colonel A. J. Hepper, R.E., with respect to an application by the Corporation to borrow £83,635 for the purchase of the Electric Light Company's undertaking. The Town Clerk (Mr. H. W. Fovargue), in stating the case for the Corporation, said a resolution was passed by the Council on Aug. 2 last, to apply for sanction to borrow £82,135 for purchasing the works. Of this sum, £80,135 was for the purchase, £2000 for compensation to officers, and £6500 had been added for new plant and machinery. The subject had been before the Council since 1897, when they instructed Mr. Hawtayne to ascertain the cost of providing electric light for public purposes in the borough. Whereas the Corporation lighting bill was then £5923 per annum, Mr. Hawtayne advised them that to put down their own plant for light equal to that then received would cost £3671 per annum, which would result in a considerable yearly saving on the lighting of public buildings and lamps. A Provisional Order, both for public and private purposes, was obtained, and negotiations were entered into with the Company for the purchase of their undertaking. At first there was considerable difference between the parties; but they ultimately came to terms. The Company's profits for 1898 amounted to £4574; and they had based their calculations on 18 years' purchase. The gross profits of the Company in 1896 were £3141; in 1897, £3619; in 1898, £4574; and for three-quarters of the present year they had been £1164 more than for the corresponding period of 1898. Mr. Climpson, a member of the Council, put several questions to the Town Clerk, and opposed the price but not the purchase. Mr. Hawtayne, who valued the undertaking, stated that he thought the Council had a very good bargain. It was certainly possible to reduce the cost by the substitution of more modern machinery. At the close of the inquiry, the Inspector visited the works.

A lively debate took place at the Luton Town Council last Tuesday, when tenders for the new electric lighting scheme were discussed. Two years ago, the Consulting Engineer (Mr. Albion T. Snell) reckoned the first outlay at less than £20,000; but the figures submitted on Tuesday showed an estimated expenditure of £26,000. This was accounted for largely by the rise in the price of materials, the fact that the lowest tenders were not in every case accepted, and the spending of £2000 extra on the buildings and shaft. Mr. Snell's report stated that 53 tenders were received, and he recommended certain of them for acceptance; the total amount being £16,675. The plant is equal to running 8500 lamps simultaneously. In moving the adoption of the report, the Chairman said the Committee had every confidence in their adviser; Mr. Snell having provided an excellent scheme. The buildings, &c., would cost £6500, and would be sufficient for 1000-horse power; while incidentals and trenching made up the balance. He suggested that in applying for the loan of £26,000, permission might be asked to postpone paying off principal for the first few years, so as to lessen the capital burden on the undertaking. The Chairman of the Highways and Lighting Committee protested against spending £500 on street lighting, while they had such excellent terms from the Gas Company and splendid incandescent gas lighting. He had visited Chelmsford, and had to grope about to find his way; and that was in electrically lighted streets. An Alderman mentioned that the Gas Company gave the Corporation £150 worth of gas free; and a Councillor pointed out how electricity had been superseded by incandescent gas for street lighting in Liverpool, Birkenhead, and other towns. Bedford had now spent £100,000 on its electric installation, and yet showed a deficit; while the street lighting by electricity had proved very expensive. He estimated the first year's loss in Luton at £1800, or equal to a 4d. rate. The Chairman pleaded for the inclusion of street lighting as providing custom for the undertaking and helping to popularize the light. The tenders were accepted by 15 votes to 3—the latter dissenting on the public lighting question; while six members did not vote.

At the meeting of the Wigan County Borough Council last Wednesday, an innocent-looking paragraph on the minutes of the Electric Light and Tramways Committee gave rise to a long discussion, and was eventually taken back by the Committee. It ran as follows: "That the Electrical Engineer be allowed to advise consumers of electricity for the space of twelve months." Mr. Wilson pointed out that while the resolution gave permission to the Electrical Engineer to render help to intending consumers, it gave him permission at the same time to make such arrangements as he might think necessary, as between himself and them, for his private remuneration; that the question of fee was to be settled by the Engineer and the consumers; and that when this fee had been rightly and properly earned, it was to be paid direct to the Engineer without in any way being brought to the knowledge of the Committee who had this particular matter in hand, or the Council. He did not think for a moment that the gentleman who at present occupied the position of Electrical Engineer would abuse the resolution, but he did say that the permission given to him as it stood was capable of abuse; and his own strong view was that he should feel disposed to lay it down as a strict rule, applicable to every official of the Corporation, that he, in the discharge of the duties which appertained to his particular department and appointment, be not allowed or permitted to receive any reward, fee, remuneration, or emolument whatever, except through the hands of his own Committee, and with the sanction of the Council. The Chairman of the Committee (Mr. Worthington) said they found themselves in this position: Persons were not only asking for instructions (which they could give them) but also for specifications; and these were things which the public should pay for, and yet they were not within the scope of the appointment of the Electrical Engineer. Therefore, the question was before them what was best to be done to hasten the use of electricity, and at the same time do justice to their servant, without any injustice to the public. He rather agreed that the better principle of dealing with the matter would be to increase his remuneration, and let it go direct through the Coporation. He thought the principle was sound, and on this ground, the Committee might reconsider it. He would therefore propose the confirmation of the minutes, subject to the paragraph being expunged. This proposal was adopted.

Warrington Corporation Water-Works Extensions.—The Warrington Corporation last Tuesday adopted several important recommendations of the Water Committee in connection with the extension of the water-works. Among them, the tender of Mr. George Bell for the construction of a new reservoir at Winwick for the sum of £22,048 19s. 6d. was accepted; as was also that of the Glenfield Company, Limited, for the supply of valves and fittings in connection with it. The Water Engineer was also instructed to lay a new 8-inch main from Winwick to Hill Warren,

BIRMINGHAM CORPORATION WATER SUPPLY.

The Consumption of Water—Retention of Old Works.

The report of the Birmingham Corporation Water Committee, noticed last week, was laid before the City Council by Alderman Lawley Parker last Tuesday. He stated that the past summer was an anxious one for the department. The demand for water had greatly exceeded that of any previous period; and in one week they had to supply 23 million gallons daily, which was greater than their power of production by 3 million gallons. The advance was met only by exhausting the service reservoirs, which was done in a short time. Stringent measures were taken to reduce the use of water; and for the first time it was pointed out to consumers that the use of hose was illegal. By this means they just managed to scrape through without having an intermittent supply. The Committee had before them—certainly for two or three years—a very anxious time; and much would depend upon the summer weather. Dry summers, similar to the last two, would place them in great straits. The Committee were now considering means whereby additional temporary supplies might be obtained; but even if they were secured, the situation would not be much relieved. In reference to the retention of existing works, he stated that the difference between the maximum and the ordinary demand was sometimes as high as 25 per cent. This difference, for which he could not account, was much greater than in most places; and he should not like to say that the consumers were not so careful with the water. After a careful forecast of the probable demand for water, the Committee considered it would be advisable to retain, as an emergency supply, that part of the existing works of which the yield was satisfactory, and which could be utilized without repumping at Aston. By such a course, they hoped to postpone for some years the provision of a third pipe on the Elan aqueduct. The two pipes would bring a daily supply of 27 million gallons. The yield of the discarded works was 7½ million gallons daily; and they proposed to retain the River Bourne, with reservoir, Plant's Brook, and the wells of Aston, Short Heath, with Witton reservoir, Long Bridge, and Selly Oak. The yield of these works was 12½ million gallons a day, or nearly equal to the supply of a third pipe if laid. With regard to the quality of the water, the Committee were of opinion that, judging from the chemical and bacterial examination, it would, with proper filtration in the case of the rivers, be safe and wholesome. Of course, if any sources were proved not to be so, they would be discontinued; and the third pipe would be laid at an earlier date than proposed. The annual charge involved in the provision of an additional pipe would so largely exceed the cost of retaining and maintaining the existing works, that if they could postpone the laying of the third pipe for ten, fifteen, or twenty years, a saving would be made of something like £100,000 on the annual charge spread over the period. The report (which was not discussed) was adopted.

According to a Dalziel telegram, the town of Johannesburg is quiet, notwithstanding the war. The electric lighting and water works are in full operation.

THE CAMBRIDGE CORPORATION AND THE WATER-WORKS.

The Purchase to be Proceeded With.

At the Meeting of the Cambridge Town Council on the 30th ult., the question of promoting a Bill next session to sanction, among other things, the purchase of the undertaking of the Cambridge University and Town Water-Works Company was again under consideration. The Special Sub-Committee appointed to report on the probable cost of the acquisition of the works by compulsory purchase presented a statement, in the course of which they pointed out that the amount an umpire would be likely to award would depend upon the expert evidence brought forward at the arbitration proceedings; and therefore they felt they could not name a sum with sufficient accuracy to be a trustworthy guide to the Council. The Committee expressed the opinion that, if the purchase were completed, the method of annuities was the most desirable one; but the exact details of what offer should be made to the Company could not be settled until the condition of the Company's plant had been ascertained by an expert. The following figures were prepared by the Borough Accountant for the information of the Council: "The maximum dividends which can be distributed annually by the Company amount to £9895; and 25 years' purchase of these dividends, *plus* the existing mortgage loans of the Company (amounting to £28,250) would be £275,625; 30 years' purchase, £325,100; and 35 years', £374,575. Every additional year's purchase of the maximum dividends would increase the price by £9895. The annual charge to the Corporation for interest and sinking fund would be as follows, assuming the Corporation had to buy the undertaking by arbitration and not by agreement, that the loan could be raised at 3 per cent., that 2¾ per cent. could be earned by the sinking fund, and that the term for the redemption of the loan would be fixed at 60 years: Purchase-money, £275,625; annual charge, £10,121. Purchase-money, £325,100; annual charge, £11,937. Purchase-money, £374,575; annual charge, £13,753. Every additional year's purchase would increase the annual charge by £363. The profit made by the Company for the year ending July 6 last was £12,083, of which sum £905 was paid as interest on mortgage loans; leaving £11,178 available for dividend, contingency fund, &c."

The Mayor (Mr. A. I. Tillyard) moved that the Council authorize the purchase of the Water Company's undertaking. He remarked that parliamentary sanction for the acquisition of the water-works by agreement could not be obtained before May or June next; and, in the meantime, the Corporation would have abundant opportunities of running away if their courage happened to fail. But, to his mind, the best plan of promoting purchase by agreement was not to run away, but to go boldly forward, even though it involved the risk of having to purchase by arbitration. The method of purchase by agreement and by arbitration both seemed to have advantages. In an agreement, the exact sum was known beforehand; and he had no doubt that this would weigh with many. In the case of arbitration, there was, of course, the unknown sum at which the umpire would fix the value of the undertaking. The exact position of the Company could, however, be better ascertained if the matter went before arbitrators. Let them therefore, as he had said, go boldly forward; and if the Company saw that they meant business,

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1427.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21—22	..	4 15 5
100,000	10	,,	7½	Do. 7 p. c.	14½—15½	–½	4 16 9
800,000	100	July 3	5	Australian 5 p. c. Deb.	102—104	..	4 16 2
200,000	5	Nov. 15	6	Bombay, Ltd.	5¾—6¼	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid	4—4½	..	5 6 8
880,000	Stk.	Aug. 16	12	Brentford Consolidated	273—278	..	4 6 4
270,000	,,	,,	9	Do. New	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb.	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	260—260	..	4 8 6
226,320	,,	,,	8½	Do. A. Ord. Stk.	185—190	..	4 9 6
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	43½—44½	..	4 9 10
50,000	10	Aug. 31	12	Bromley, Ord. 10 p. c.	25—27	..	4 8 11
75,000	10	,,	9	Do. 7 p. c.	19—21	..	4 5 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9½—10	..	6 0 0
220,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13¾—14½	..	5 10 4
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Oct. 13	13½	Commercial Old Stock	308—313	..	4 6 3
200,750	,,	,,	10½	Do. New do.	240—245	..	4 5 9
200,750	,,	June 15	4½	Do. 4½ p. c. Deb.	143—148	..	3 0 10
800,000	Stk.	June 15	9†	Continental Union, Ltd.	185—190	..	4 14 9
200,000	,,	,,	7	Do. 7 p. c. Pref.	183—187	..	3 14 10
51,600	Stk	Aug. 31	14	Croydon A 10 p. c.	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p. c.	265—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	130—135	..	3 17 9
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd.	21—22	–½	5 0 0
354,060	10	,,	11	Do. £7 10s. paid	15½—16½	–½	5 0 0
14,993,075	Stk.	Aug. 16	4⅝	Gas-light and Coke	4 p. c. Ord.	103—105	–1	4 13 4
2,600,000	,,	,,	3½		3½ p. c. max.	97—99	..	3 10 8
3,799,735	,,	,,	4		4 p. c. Con. Pref.	120—123	..	3 5 1
3,993,975	,,	June 15	3		3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	Nov. 15	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4
3,800,000	Stk.	Nov. 15	10	Imperial Continental		220—225	..	4 8 11
473,600	Stk.	Aug. 16	3½	Do. 3½ p. c. Deb. Red.		101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd.		5—5½	..	5 9 1
560,000	100	Oct. 2	5	Met. of	5 p. c. Deb.	110—114	..	4 7 9
250,000	100	,,	4½	Melbourne	4½ p. c. Deb.	107—109	–1	4 2 7
541,920	20	Nov. 15	3	Monte Video, Ltd.		11—12	..	5 0 0
617,946	Stk.	Aug. 31	9½	Newc'tle & Gatesh'd Con.		220—225	..	4 2 3
264,855	Stk.	June 29	3½	Do. 3½ p. c. Deb.		106—109	..	3 4 3
60,000	5	Sept. 29	7	Ottoman, Ltd.		5½—5¾ *Ex div.	..	6 1 9

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 30	8	Oriental, Ltd.	7½—7¾†	..	5 8 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾—6¾*	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1½*	..	4 11 5
500,000	100	Dec. 1	6	People's Gas of Chicago 2nd Mtg. Bonds	102—106†	..	5 13 2
851,070	10	Oct. 13	7	River Plate Ord.	11—11½	..	6 1 9
250,000	Stk.	June 29	4	Do. 4 p. c. Deb.	100—102	..	7 8 2
250,000	10	Sept. 15	10	San Paulo, Ltd.	12—13	..	7 13 10
135,000	Stk.	Sept. 15	10	Sheffield A.	247—249	..	4 0 4
209,053	,,	,,	10	Do. B.	247—249	..	4 0 4
447,427	,,	,,	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5½	South Metrop., 4 p.c. Ord.	134—137	–1½	3 17 10
1,520,000	,,	July 13	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham A. 5 p.c. and B. 8½ p.c.	141—143	..	4 3 11
250,520	,,	,,	4½		102—104	..	4 6 6
55,100	,,	,,	—	Edmonton 4 p.c. Deb.	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
149,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p. c. Pref.	163—168	..	2 19 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	145—150	..	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb.	150—155	..	2 18 1
1,720,560	Stk.	Oct. 13	7	East London, Ord.	202—207	..	3 7 8
654,740	,,	June 29	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
890,000	,,	,,	3	Do. 3 p. c. Deb.	101—103	..	2 18 3
700,000	50	June 15	7½	Grand Junction 10 p. c. max.	110—113	..	8 6 5
310,000	Stk.	Sept. 29	4		4 p. c. Deb.	133—138	..	2 18 0
708,000	Stk.	Aug. 16	14	Kent	353—368	..	3 18 3
160,000	,,	,,	7	Do. New, 7 p. c. max.	200—210	–5½	3 6 8
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max.	295—300	–3	3 10 0
406,200	100	,,	8	Do. 7½ p. c. max.	225—230	..	3 9 7
850,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.	136—140	..	2 17 2
500,000	100	Aug. 16	13½	New River, New Shares	428—433	..	3 2 4
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb.	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South-wark and Vauxhall Ord.	212—217	–1	3 9 1
126,500	100	,,	7½		7½ p. c. max.	193—198	..	3 15 9
489,200	Stk.	,,	5		5 p. c. Pref.	165—170	..	2 18 10
1,019,585	,,	Oct. 13	4		4 p. c. A Deb.	131—136	..	2 18 10
1,155,066	Stk.	June 15	10	West Middlesex	297—302	–1	3 6 3
200,000	,,	,,	4½	Do. 4½ p. c. Deb.	152—157	..	2 17 4
200,000	,,	Sept. 15	8	Do. 8 p. c. Deb.	101—103	..	2 18 3

† Next dividend will be at this rate.

they were more likely, under the circumstances, to come to an agreement with them than if the Council now showed the white feather and ran away.

Alderman Darwin seconded the proposition; remarking that he was not in favour of municipal trading as a rule, but thought the supply of water was an exception. Moreover, on sanitary grounds it was, in his opinion, desirable that the water-works should be in the hands of the Local Authority. Mr. Flack pointed out that the Water Company were large ratepayers, and that the Corporation derived a considerable income from them. Alderman Porter said he would adhere to the adverse vote he had given on a previous occasion. He felt very strongly indeed that the attempt to pass a Bill next session would end in failure. Dr. Waraker said Alderman Darwin had spoken in favour of the acquisition of the water-works on sanitary grounds. He (Dr. Waraker) was bound to say he thought they had a much better guarantee for the quantity and quality of the water while the supply was in the hands of the Company than they would have if it were in those of the Corporation. The Company had to earn their money and make a profit; and in order to do this they must be careful to provide water of good quality and abundant in quantity. It had not been for a moment pretended that they could find any fault with the Company on either of these grounds. Why, then, should they want to disturb the undertaking? There had been in recent years a typhoid epidemic at King's Lynn, where the water supply was in the hands of the Corporation, and had been complained of for many years. This was conclusive evidence that placing the water-works in the hands of the local authority did not ensure the supply of an improved quality of water. Mr. Pollock expressed the opinion that the purchase would necessitate an extra rate of 2d. or 3d. in the pound; and all they would get for it would be the satisfaction of managing the water undertaking themselves, for they could not expect to have the water better or cheaper than they did at present. Alderman Hills, as Chairman of the Sanitary Committee, considered it a matter of duty that the Corporation should get the water-works into their own hands. Alderman J. Taylor said he felt bound to oppose the resolution. He did so, first of all, because he did not believe in corporation trading. On the figures which had been placed before them, he had come to the conclusion they had no right to risk the money of the ratepayers to the extent of £300,000 or £400,000. He felt pretty sure that, if they were successful in getting the water supply into their own hands, they would not be able to work the undertaking in a more economical manner than it had been conducted during past years. Mr. Nicholls confessed that he supported the motion on a previous occasion in ignorance of the facts. He had no conception of the fabulous amount they would have to pay for the purchase of the undertaking. It would be a grave injustice to the ratepayers to saddle them with such an enormous amount as £400,000. He was one of those who thought the Corporation would not be able to manage the undertaking half so well as the present Company. The Mayor pointed out that, though the Corporation might incur financial risks in purchasing the water-works, they were buying a paying concern.

The motion was then put, and, on a show of hands, was declared carried by 25 votes to 19.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

A step of some importance in the development of the quarrel which the Gas Workers and General Labourers Union have instigated between the Corporation of Glasgow and their gas workers, was taken by the Corporation on Thursday. The memorial from the Union, containing proposals for a Conciliation Board, was transmitted to the Town Council by the Gas Committee without any recommendation one way or another; and the Corporation, after a lively and suggestive debate, which will be found in another column of the "JOURNAL," declined, by 41 votes to 22, to adopt it. The motion which was thus carried was to allow the memorial to lie on the table. The counter-motion was that it be remitted to the Gas Committee. There was a third motion—that it be remitted to the Conveners of all the Standing Committees of the Council; but this received the support of only five members. By this resolution, the Council have asserted their determination that the management of the gas undertaking shall remain in their own hands. To me it is amazing how any member of the Corporation could have entertained a proposal which would have relegated the management to other hands—which would, in fact, have placed the vast property owned by the Corporation in their gas department, at the jeopardy of a body of persons who have no interest whatever in Glasgow. If on no other ground, it ought to have appeared to anyone who applied his mind to the subject that there was absurdity in men who ask, on the one hand, that none but ratepayers be employed in the gas-works, demanding, on the other, that non-ratepayers should have the control of the entire undertaking. But there is a higher ground of objection to the proposal than this. The realities of life do not seem to be appreciated by some people. Every member of the Corporation has been returned by the electorate for the purpose of performing certain duties, statutory and otherwise, on behalf of the community, which it would be inconvenient, and in many cases impossible, for the community to perform for themselves; and every member of the Corporation, on accepting office, takes a solemn obligation that he will faithfully discharge the duties which fall to him. There is no authority, either in statute or in practice, for delegation of duties, except in the way of the employment of officials and workpeople to do work for remuneration—that is, to carry out the orders of the Council—and in which case the Council remain masters. It would, therefore, be not only absurd, it would be a positive dereliction of duty, for the Town Council to allow anyone except themselves to occupy a position in which they could give directions by which the assets of the city might be affected or prejudiced. Yet there appear to be at least 22 out of the 72 councillors representing the City of Glasgow who would not scruple to make such an arrangement.

This state of mind seems the special appropriation of those who place class before communal interests. They enter public life with the avowed purpose of bettering one section of the community at the expense of the other. The thoughtlessness, the unreasonableness, if not the wickedness, of their attitude to public questions, is apparent when it is called to

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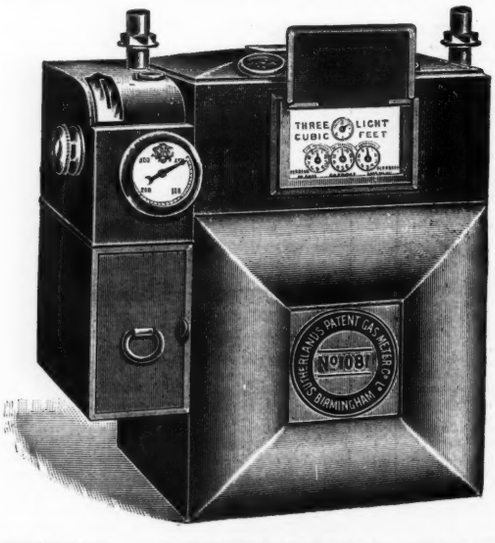

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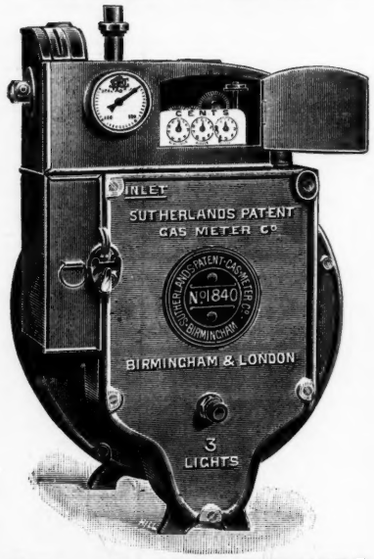

THE SUTHERLAND GAS-METER COMPANY
ESSEX WORKS, BIRMINGHAM.

mind that their professed aims are those of equality, while their methods are redolent of privilege. The growth of this spirit is an evil of our times. That it is growing in other places besides Glasgow, there is no room for doubt. It is this which gives the present doings in Glasgow their chief significance. They are no isolated incidents; they are part of a propagandist scheme which, according to one speaker, has had some success already in Leeds, Hull, and other cities. I suppose Glasgow has been selected for attack on account of its great industrial population, coupled with the fact that in it the public services are already very largely municipalized. On account of these circumstances, victory might be easier, and the consequences more striking, in Glasgow than in other places. The Corporation have carried the day this time; but what of the future? That trouble is meant to be given, is intimated by the District Secretary of the Union, in his letter to the "Glasgow Herald." They are to fight for the abolition of the contract system. They say they wish the recognition of the Union. It is rather the supremacy of the Union they have in view, because recognition would be of no use without power. If recognition should be gained, the so-called Conciliation Board would soon blossom out into its true character—a domination board. And it would be a domination board, not for gas workers only, but for all the unskilled labour in the employment of the Corporation. The Union is a General Labourers' Union. Should the labourers in the gas-works receive advancement, in time or wages, would the labourers in the other departments of the Corporation remain content without equivalent ameliorations? I fancy not. The Union would not allow them, even though the men should wish to remain quiet. A Union is not formed without a purpose.

There is one hopeful ray in the matter, to be found in the remark of Mr. Graham that the men were feeling the incubus of the Union. If the men do not support the Union, the Union will be powerless. If left to themselves, I incline to the belief that the men in the gas-works have no interest in the Union. Perhaps a year ago they were only general labourers, subject to broken time and exposure to the weather, and earning only 20s. a week, when fully employed. Now they have constant employment, mostly under cover, medical attendance and other privileges, and a wage of 35s. a week. Corporation employment means security and comfort for them; and they have thus no reason to do anything which would cause trouble to the Corporation, but rather are under obligation to give the best service in their power. There are, however, as we have seen, about 20 members of the Town Council the breath of whose public life is the organization of labour; and it is from them that the chief trouble may be expected. The situation is one which calls for the display of unusual qualities in the matter of management. The Corporation have been masters hitherto. They will, I feel almost certain, be able to retain their power; but they will have a struggle. Even already the first notes of battle are sounded; for two notices have been given of motions proposing consideration of means for avoiding labour disputes, and the formation of a Conciliation Board.

The Commissioners of the Burgh of Troon have found, as is nearly always the case, that in taking over the undertaking of the Gas Company they have come into the possession of works which require a good deal of renovation. They are renewing or extending almost everything except the buildings. Under the advice of Mr. A. Gillespie, of Glasgow, they have erected this season an engine, boiler, exhauster, and washer and scrubber. A photometer has arrived at the works, and will soon be fitted up. Before next winter, it is proposed to erect a new retort-bench, coal-stores, and gasholder, and to have a siding into the works from the line of the Glasgow and South-Western Railway Company. On Tuesday of last week, the Gas Committee, accompanied by Mr. Gillespie, paid a visit of inspection to the works, and found the new plant to be working satisfactorily. Mr. Gillespie was complimented by Provost Logan on the success which has attended the work which he has undertaken for the Commissioners.

At Hawick, a question has arisen as to the assessment upon business premises for water purposes. At a meeting of the Corporation on Tuesday, a letter was read from the manufacturers intimating that, in the event of the Corporation insisting on assessing them for water on the full value of their premises, instead of only on one-fourth of the value as formerly, they have resolved to bring the matter before the Court of Session, so as to obtain an authoritative decision as to the interpretation of the Public Health Act, under which the Corporation are proceeding. Before taking this extreme step, however, the manufacturers suggested that the Corporation should agree to a special case being brought before the Court of Session; the expenses to be borne mutually. Some of the councillors were disposed to agree to this, as the least expensive method of settling a doubtful point; but others objected. Councillor Renwick pointed out that the shopkeepers had paid their water assessment in full, and he did not see why the manufacturers should have adopted a dog-in-the-manger policy. It seemed to be a case of hanging the sword of Damocles over their heads. Councillor Simpson moved that the Council delay the matter until it was seen whether the Convention of Burghs would bring a test case before the Court of Session, as recommended by the Convention's Committee; there being a number of burghs in Scotland in the same position as Hawick in respect of water assessment. After discussion, the motion was agreed to by a majority.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 9.

Sulphate of Ammonia.—The market has been firm at all points; and prices have gradually hardened—the closing quotations being £11 6s. 3d. to £11 10s. per ton, delivered f.o.b. at the ports. The larger makes are for the most part being delivered against contracts; and available supplies have been limited. But these have been readily disposed of, although consumers are rather slow in coming into line with the advance. In the forward position, buyers were inclined to resist a further advance in the early part of the week; but £11 13s. 9d. per ton f.o.b. Leith, ordinary terms, has since repeatedly been paid for January-June delivery, though a little less would probably be accepted for January-March. In

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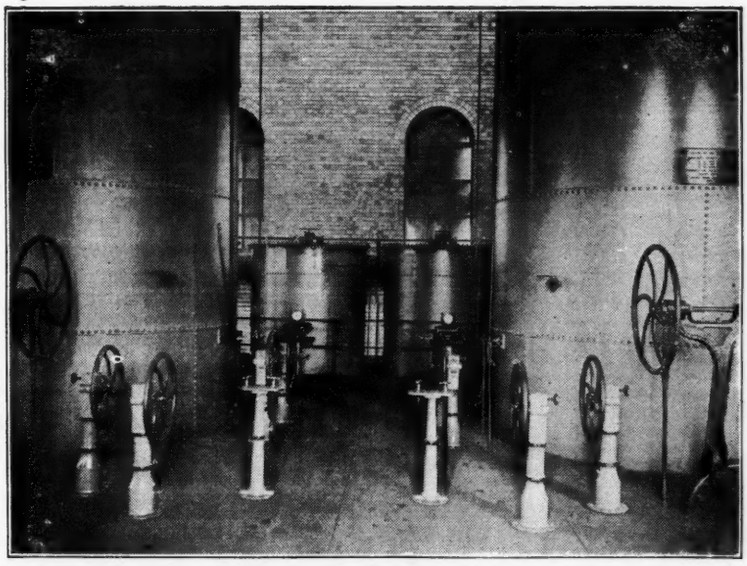

RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

London, January-March has been done at £11 10s. per ton, Beckton terms; and £11 12s. 6d. is now asked.

Nitrate of Soda remains firm at 7s. 10½d. per cwt. for good, and 8s. for refined, quality, on spot.

London, *Dec.* 9.

Tar Products.—There is undoubtedly a better market for benzols, although buyers do not feel disposed to pay any advance in price. Nineties benzol, which has been so long a drug, now finds ready buyers. The difficulties, however, in transport, particularly with some of the railway companies, interferes somewhat seriously with business in certain quarters. A large business in benzol is reported at prices quoted below, which, of course, are, as is usual, less 2½ per cent. discount, casks included, and delivered free on board. Pitch is steadier, with a tendency to better value; and large shipments are being made. Solvent naphtha is firm; crude naphtha is in moderate request; creosote and heavy oils are steady; while carbolic acid shows further improvement in price. Some inquiry is again to the fore in anthracene; but buyers' ideas of value are much below what would induce makers to resume extracting it from their tar oils.

Business prices during the past week have been: Tar, 16s. 6d. to 25s. 6d. Pitch, east coast, 33s. 6d.; west coast, 31s. Benzol, 90's, 8½d., 50's, 10½d. Toluol, 90 per cent., 1s. 3½d.; pure, 2s. 4d. Solvent naphtha; 1s. 4d. Crude, 30 per cent., naphtha, 5d. Heavy naphtha, 1s. 2½d. Creosote, 3½d. Heavy oils, 65s. Carbolic acid, 50's, 2s. 9d.; 60's, 3s. Crude naphthalene, 52s. 6d. Anthracene, nominal, "A" quality, 3½d.; "B," 2½d.

Sulphate of Ammonia.—A healthy active market has characterized the week; and though there has been no change in prices (which continue about £11 5s. to £11 10s., less 3½ per cent. at the principal ports for early delivery), buyers will be willing to pay more money for the early months of next year.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The concession of the 5 per cent. advance in wages to the miners was only what had been fully anticipated; but the additional arrangement with regard to the continuance of the Conciliation Board for a further period of three years, is a new feature which, if carried into effect, will tend greatly towards a prolonged settled attitude on the part of the coalowners and the Miners' Federation, which cannot fail to have a very satisfactory influence on the trade generally. As to the position of the trade here, the only material change to notice is that the advance of 1s. 8d. per ton on engine fuel has not been so readily established as coalowners in West Lancashire evidently anticipated. The Lancashire Coal Sales Association, representing West Lancashire, have had to re-consider the situation; and the result is that West Lancashire coalowners are at liberty to use their own discretion with regard to the price of engine fuel, where they come into competition with collieries in other districts who have not advanced their rates more than 10d. per ton. There is still a scarcity of supplies of engine fuel on the market; but Yorkshire slack has been offered here on contract at much lower figures than Lancashire collieries are prepared to take. Steam and forge coals continue in brisk request for inland requirements. But supplies for shipment are perhaps rather more plentiful, as at collieries where house-fired descriptions have been hanging during the spell of exceptionally mild weather, these have been sent off for prompt shipping clearance at something like steam coal prices. With regard to the better qualities of round coal, there is still an absence of the usual winter's demand; and supplies of these are generally plentiful. Pit prices may be given as about 13s. 4d. to 13s. 10d. per ton for best Wigan Arley, 11s. 8d. to 12s. 6d. for Pemberton four-feet and seconds Arley, 10s. 6d. to 11s. common round coal, 8s. 6d. to 9s. for best slack, 8s. to 8s. 6d. for medium, and 7s. to 7s. 6d. for common sorts. Steam coal, delivered at the Mersey ports or on the Manchester Ship Canal, ranges from about 11s. 6d. to 12s. 6d. per ton. There is a continued pressure of demand for coke; and it is probable a meeting of the Lancashire Makers' Association will be held this month, with a view of further raising prices. Quotations are exceedingly firm at 28s. for good foundry cokes, and 22s. for furnace qualities, at the ovens; and makers have to decline a good deal of business.

Northern Coal Trade.—There is a very strong demand for coals; and with heavy shipments, the prices are firm at recent advances. For best Northumbrian steam coals, quotations vary from 14s. to 14s. 6d. per ton f.o.b., second-class steams are 13s. 6d., and steam smalls 8s. 3d. In the gas coal trade, there is a very full demand; but there is not much coal left free for sale to occasional buyers. For such sales, 15s. to 15s. 6d. per ton f.o.b. is the current quotation; and these prices have been paid to obtain small lots for early delivery. For gas coke, the price generally quoted is about 14s. per ton f.o.b. The production is now very heavy; but it is well taken up.

Scotch Coal Trade.—The coal trade in Scotland is strong and active. The home demand does not abate; and the orders for foreign ports, particularly in the Mediterranean, are getting larger week by week, which has the effect of putting up prices. It is, as a matter of fact, difficult to get current quotations, because, in view of improved prices for shipping orders, coalowners are disposed to keep coal back; and the familiar outcry is being made, as is the case when the export trade offers to be busy, that the Railway Companies do not provide a sufficient supply of waggons. The prices quoted are: Main 10s. 6d. to 10s. 9d. per ton f.o.b. Glasgow, ell 11s. 3d. to 12s., and splint 12s. to 12s. 3d. The shipments for the week amounted to 202,435 tons—an increase of 19,546 tons upon the previous week, and of 45,947 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,218,223 tons—a decrease of 839,863 tons upon the same period of last year.

The Gas Committee of the Hereford Town Council have received permission to borrow £2500 for the extension of the prepayment system of gas supply. This looks as though its popularity is extending in the borough.

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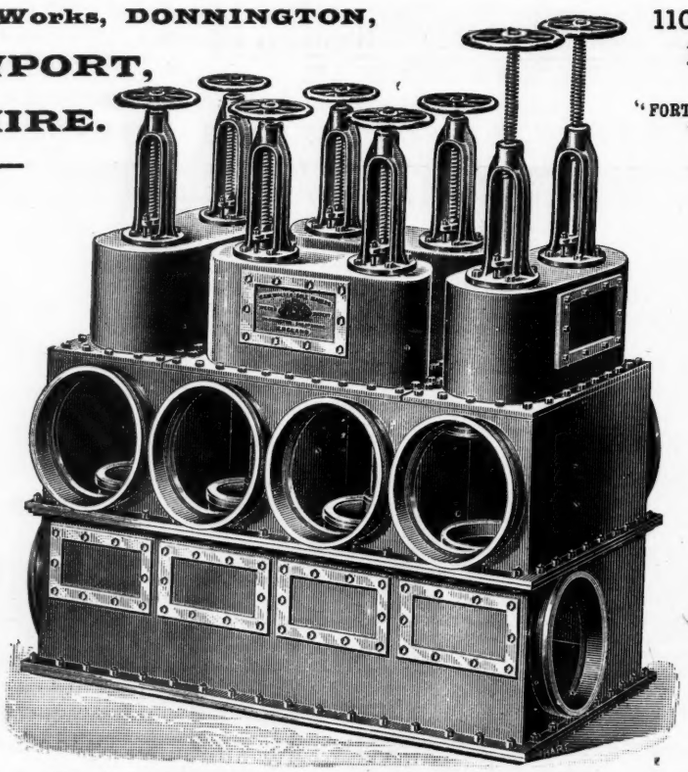

GASHOLDERS.
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SCRUBBERS.
SULPHATE OF AMMONIA PLANT.
CONDENSERS.
VALVES.
TAR-BURNERS.

Weck's Patent Centre-Valve for Four Purifiers.

The Production of Calcium Carbide.—We learn from "Engineering" that the manufacture of calcium carbide in Sweden is rapidly increasing. Not only is the Trollhöttar factory, which for some time was the only one established there, being extended, but new works have been erected at Alby, Mansbo, and Brattfors, the first of which has already commenced operations. This will bring the annual production up from 1000 to 6000 tons. As the home consumption in Sweden is only about 100 tons this year, the bulk of the carbide is intended for export.

The Otley Water Scheme.—The revised water-works scheme of the Otley District Council was submitted to a meeting of the ratepayers last Tuesday evening, and by a sufficient vote, so far as the statute goes, the Council were authorized to promote a Bill in the next session of Parliament. It is evident, however, that the ratepayers are lukewarm in the matter. Excluding members and officers of the Council, only 50 people were present, though the scheme involves the expenditure of £43,000; and of these 23 did not take the trouble to vote, and five of the number remained neutral.

Southwark and Vauxhall Water Company.—The report of the Directors for the six months ending Sept. 30 states that the number of new domestic supplies taken into charge during the half year was 738, estimated to produce an increased annual rental of £1766. The Directors observe that, notwithstanding the fact that the Royal Commission on Water Supply have not yet issued their final report, the London County Council have given notice of their intention of again introducing Bills for similar purposes to those which Parliament have previously declined to consider. Reference is made to the notice given by the Water Companies of the introduction of a Bill empowering the Local Government Board, after due inquiry, to order the construction of such extra storage reservoirs in the Thames Valley as may appear necessary. The Directors recommend a dividend at the rate of 5 per cent. per annum on the preference stock, and of 7½ per cent. per annum on the ordinary stock and class "D" shares of the Company.

A Singular Mishap to the Aldeburgh Water Supply.—A curious state of affairs exists in connection with the water supply of Aldeburgh. The Corporation are carrying out a sewerage scheme; and part of the work consists in excavating a big receiving tank on the south side of the town. At some distance away, but on the same level of low marsh land, there is situated the reservoir of the Water Company, which is supplied from a cluster of springs. As the sewage-receiving tank was dug out to a greater depth than the water-reservoir, the underground springs gravitated to the lower point; so that, while the one receptacle began to fill with water, the other began to get empty. The sewerage contractors were bound to keep their tank dry, if possible, until it could be walled in, and two powerful engines were employed to pump it out; but the more they pumped, the worse it became for the reservoir. The upshot was that, on Sunday last week, the public supply was cut off; and the consumers were put to great inconvenience. A partial remedy was soon discovered; but complaints as to want of water continued to appear in the local Press during the week. The incident will no doubt incite further opposition to the water-works purchase.

Postponement of the Colwyn Bay Gas-Works Purchase Question.—A special meeting of the Colwyn Bay District Council was held on Friday, to consider the desirability of passing a resolution to authorize the Council to promote a Bill in the next session of Parliament for the transfer of the undertaking of the Colwyn Bay and District Gas Company to the Council. In proposing the resolution, the Chairman (Mr. G. Bevan) said it had already been decided to apply for a Provisional Order; but they had since been advised to have an Act of Parliament. On the motion being put, five members voted for it, and five against. As the statute requires a vote of seven members, the motion was lost. It was subsequently further decided to drop the application for a Provisional Order this session, and to reconsider the question next year.

Prepayment Gas-Meters and Cooking-Stoves at Southport.—In a return presented to the Gas Committee of the Southport Corporation by Mr. John Booth, the Engineer, some interesting figures are given in regard to the consumption of gas during the past quarter. The total quantity made was 73,399,000 cubic feet—an increase of nearly 500,000 cubic feet compared with the preceding year. The only decrease shown was in the quantity used for private lighting. The popularity of the penny-in-the slot method is shown by the fact that no less than 1,305,700 cubic feet passed through these meters, while above 21 million cubic feet were used for cooking purposes. Birkdale proved a good customer to the Corporation, since it purchased 10 million cubic feet in the course of the quarter, although in this case also there is a marked diminution in the quantity used for private lighting. The gross profit on revenue account for the past half year was £4609.

Inauguration of New Pumping Plant at St. Albans.—Extensive new pumping plant for the St. Albans Water Company was inaugurated last Friday. The engines and pumps have been constructed, according to the plans and specifications of Mr. A. F. Phillips, the Company's Engineer, by Messrs. Simpson and Co., of Pimlico; while the boring operations have been carried out by Messrs. Le Grand and Sutcliffe. Mr. Phillips stated that the new engine contained all recent improvements, both of the English and American type. It developed slightly more than 1000-horse power, and was capable of raising 1500 gallons of water per minute to a height of 240 feet. Three wells had been sunk to supply the new plant, which yielded together 118,000 gallons per hour; and therefore upwards of 2½ million gallons per day could be raised from the works, in addition to the 600,000 gallons from the old works. There was thus provided a water supply equal to six times the present requirements of St. Albans. The Company also possessed three independent sets of pumping plant, each sufficient to raise the water needed by the consumers; and, in order to meet any contingency from a broken main, a second pumping main had been laid round the western side of the city, in addition to the original one which passed through it. The starting apparatus having been unloosened by Mrs. A. F. Phillips, who wished the Company continued prosperity, Mr. H. J. Toulmin, J.P., the Mayor of St. Albans, set the machinery in motion. An interested company, including several of the members of the Town Corporation, attended the ceremony.

PUBLIC CAUTION.

The Trade and the Public are warned against the

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lately placed upon the Market. All **DEALERS** and **USERS** of the

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are requested to ignore the Newspaper Threats of the New Sunlight Incandescent Company, Limited, and, in case of an Action being brought, to at once communicate with the Welsbach Company, who, upon receipt of the Writ, are prepared to take the Defence of the Action into their own hands, and to Indemnify the person attacked from all consequences.

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DEALERS and USERS are also WARNED not to believe the rumours circulated by Infringers, that the Company's Patent Rights expire shortly. These rights

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76-80, York Street,
Westminster, London, S.W.

Gas-Works Extensions at Ilkeston.—At last Tuesday's meeting of the Ilkeston Town Council, the Town Clerk read a memorial which he had prepared for presentation to the Local Government Board, asking for a Provisional Order to extend the gas-works, at an estimated cost of £16,350. Some discussion took place as to the advisability of proceeding with this, seeing that the electricity scheme was shortly to be carried out. It was pointed out that the extension would not be undertaken unless there was necessity for it.

The Morecambe District Council and the Gas-Works.—As the result of a meeting held in London last Thursday, terms were arranged for the acquisition by the Morecambe District Council of the undertaking of the Morecambe Gas Company. The purchase price was fixed at £140,000. The capital of the Company consists of £20,000 of ordinary 10 per cent. stock, £2600 of 7 per cent. stock, and £16,000 of 6 per cent. new cumulative preference stock; and there is a £9000 mortgage at 3 per cent. The undertaking is being acquired subject to this mortgage. The profits last year were £5484, and the dividend was 12 per cent. The price works out at 26½ years' purchase. The agreement for the acquisition of the undertaking will come into effect on July 1 next year.

The Varying of Settled Contracts.—A question of principle in connection with Corporation contracts generally was raised on the submission of the Highways Committee's minutes at the meeting of the Leeds City Council last Wednesday. It was proposed that an increase of 3d. a ton applied for by the sand contractors should be allowed. To this exception was taken by Mr. Henry, who saw in it the possible danger of every contractor wanting to vary his contracts. An amendment to refer the matter back was moved by Mr. Wilson, who said he had never heard of a case where a contractor had refunded money because his contract proved too remunerative. The proper course was for a contractor to stand to his bargain or throw up the contract. Alderman Knowles seconded, considering the principle of the minute to be vicious. The amendment was agreed to; and later a similar amendment, moved by Mr. Jessop (relating to the alteration of the price of copper lamps in the Electric Lighting Department), was accepted by Alderman Wigram.

Gas Purchase and Electric Lighting Questions at Grantham.—A Committee of the Grantham Town Council have just emerged from the consideration of two lighting questions with a report which shows that extreme caution is a dominating quality with them. The first question has reference to the purchase of the gas undertaking. The Committee consider that this may be safely dismissed, inasmuch as, from what they have ascertained, there is no possibility of the Corporation obtaining the undertaking upon terms which, in their opinion, can be considered reasonable. The second matter related to the Corporation undertaking the supply of electricity; and on this point the Committee do not feel justified in recommending the Council to apply for a Provisional Order for several reasons, foremost among which is that a certain loss would result on the working of the compulsory area. They further advise that consent be given to an application for a Provisional Order by the Urban Electric Supply Company, Limited. The Council have not done any harm in adopting the entire report of the Committee.

An Acetylene Lighting Scheme for Heswell.—The new Assembly Rooms at Heswell are lighed by acetylene; and it is proposed to shortly use this illuminant throughout the district. Application is being made to Parliament by a Syndicate to enable the project to be carried out.

Finedon Water Supply.—The Urban District Council of Finedon have for some time been conducting boring operations with the view of discovering a supply of water. Success appears to have rewarded their efforts. A trial well has been sunk on the Wellingborough Road to a depth of 114 feet, and on Monday last week it contained water to a depth of 54 feet.

Explosion at the Pocklington Gas-Works.—While connections were being made to new purifying plant at the Pocklington Gas-Works on Sunday evening last week, a leakage of gas occurred, which was quickly followed by an explosion. One of the workmen had a narrow escape, and when apparently enveloped in flames was rescued by the Manager, Mr. R. Spivey, who acted with commendable promptitude. The following evening the town was partially in darkness; and lamps and candles took the place of gas.

The Alleged Nuisance at the Garston Works of the Liverpool Gas Company.—The Garston District Council have received a letter from the Liverpool Gas Company stating that they will do their best to remedy the "nuisance" recently complained of in connection with their Garston works. This refers to the "odours" and "irritating and distracting noises" that are said to emanate from the premises. The Council do not consider the promised effort of the Company altogether satisfactory; and so they have decided to take legal action to prevent the continuance of the newly discovered "nuisance." At another stage of the proceedings, a letter was read from Mr. P. F. Garnett, Legal Adviser to the Council, referring to certain statements made with reference to him as Secretary of the Gas Company, and offering to resign his position as Legal Adviser. A resolution of confidence in Mr. Garnett was unanimously passed.

The Potteries Station of the British Gaslight Company.—At the meeting of the Hanley Town Council on Tuesday last week, a recommendation was introduced to appoint a deputation to wait on the Directors of the British Gaslight Company, to obtain further information with reference to their proposed application to Parliament for powers to raise additional capital and buy further land at Etruria for the purposes of the gas-works. Alderman Hammersly read a letter which the Town Clerk had received on the subject from the Secretary of the Company. This stated that the necessity for the application arose from the damage caused to the present works by the subsidence of the land on which they stood, in consequence of the mining operations beneath. The effect of this subsidence on the works was very serious; and it was increasing every day. The Directors considered, and they were advised, that there was danger that the works might at any moment be wholly or partially stopped, the result of which would be most serious for the inhabitants of Hanley. Alderman Hammersly thought a more damaging statement was never made; and it behoved every tradesman in the town who was at present using gas to lose no time in taking advantage of the electric light provided by the Corporation. The report was adopted.

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Claims for Compensation in Regard to the Brigg Gas-Works Transfer.—Two of the Brigg Gas Company's servants have sent in claims for compensation on the transfer of the undertaking to the District Council. The Manager (Mr. G. Jack) claims £1721; and the Collector (Mr. G. Clark), £753.

The Heanor Water Scheme.—At the meeting of the Heanor, Codnor, and Loscoe District Council last Wednesday, a report was received from the Local Government Board with reference to the report made by their Inspector (Mr. Perrin) on the inquiry held by him in regard to the application of the Council for sanction to raise a further sum of £1000 for experimental works of water supply. The Board decided to comply with the application, and their formal sanction was forwarded therewith.

A Water Scheme for Neath.—A meeting was held at Neath last Tuesday, with the object of promoting a scheme for the supply of the district with water. Representatives were present from the Aberavon Town Council, the Briton Ferry District Council, the Neath Town Council, and the Neath District Council. What is known as the Ystradfellte scheme was under discussion; and it was agreed to appoint a Committee of two members from each body, with power to engage the services of an expert to report on the watershed, at a cost not exceeding £300.

Wallasey Water Supply.—The Special Water Supply Committee of the Wallasey District Council have decided to make a survey of a water-pipe route to Delamere, and also to approach the Liverpool Corporation once more with a view to obtaining more favourable terms than previously submitted (see *ante* p. 1015). The Gas and Water Committee have also obtained the approval of the District Council to a proposal to sink two bore-holes at Liscard at a cost of £12,500. This is not intended as antagonistic to the Liverpool scheme, but as a stand-by in case the arrangements with the Corporation are not completed in time. If they are, this new project can be dropped if thought advisable.

The Damage to the St. Helens Corporation Gasholder: Proposed Friendly Action.—It is likely that the important question as to the liability for the great damage occasioned by the explosion at the Kurtz Chlorate Works of the United Alkali Company at St. Helens in May last will be settled by a friendly action; the Corporation having on Wednesday last confirmed the minutes of the Parliamentary Committee which contained the following: "The Town Clerk reported that the Gas and Lighting Committee had passed a resolution referring the consideration of the matter of the explosion at the Kurtz Works of the United Alkali Company, Limited, on the 12th of May last, to this Committee, with a request that they should take such action in the matter as they might think advisable. He also reported that he had laid a case before Mr. Bosanquet, Q.C., and now submitted his opinion. Resolved, in view of the opinion now submitted, that a claim be made against the United Alkali Company, Limited, for compensation in respect of the loss sustained by the Corporation (£4000) in the damage done to the gasholder belonging to them, and that it be suggested to the Company that a special case be jointly stated in a friendly way for the opinion of the High Court on the points of law involved, accepting for this purpose as a correct statement of the facts there set out, the Home Office report."

Bradford and the Cleckheaton Water Supply.—The Manager of the Bradford Corporation Water Department has replied to the complaints of the Cleckheaton District Council regarding the dirty state of the water. He asserts that the supply has been abundant in quantity and pure in quality; and, in his opinion, there is no better water in England. The Clerk to the Council has been instructed to dispute the accuracy of these statements.

The Llanelly Gas Workers' Dispute.—Last Wednesday there was a conference between the Directors of the Llanelly Gas Company and Mr. Morgan, representing the men, in connection with the pending dispute. The circumstances were discussed fairly and openly, and a disposition evinced for conciliation. It was contended by the Directors that the men did not do nearly the same amount of work as those at the Swansea Gas-Works, and that the distance over which the coal and coke had to be wheeled was considerably in favour of the Llanelly men. To the former point Mr. Morgan replied that, whereas the Llanelly men had, before blazing fires, in each shift to fill each retort with 3cwt. of coal, the men at Swansea had only to deal with 2cwt. with improved appliances. As Mr. Morgan had not measured the wheeling distances at the respective works, it was thereupon agreed that he and Mr. Edwin Morgan, one of the Directors, should visit the Swansea Gas-Works for that purpose, and report at an adjourned meeting.

Stating the Amounts of Contracts and the Names of Successful Contractors.—The Manchester Corporation have had a standing order which provides that "all Committees of this Council in giving out contracts be instructed to print the names of the successful contractors and the amounts of the contracts in the epitome every month, but without interfering with the existing exceptions provided for by sub-clause 1 of this standing order in relation to the Gas Committee, the Electricity Committee, and the Tramways Committee." In one or two instances lately, the Water Committee have not complied with this regulation, as they consider it would be ruinous for any Trading Committee to do so. In consequence, their Chairman (Sir John Harwood) moved the recision of the standing order at the meeting of the City Council last Wednesday. He urged that the adoption of the order had put the Corporation in a less favourable position in regard to competition than was the case with an independent firm. There was no man in the Council carrying on a large business, and intending to do it with the utmost economy, who would let the public know the price he was paying for the articles he used. There was no reason why the citizens of Manchester should be put to a disadvantage. Alderman Gibson, in seconding the resolution, remarked that no man in a large business would let all the world know about that business. Mr. Sutton considered that, without the publication of contracts, they could not know whether a firm was paying the standard rate of wages. Mr. Scott supported the standing order; while Mr. Hampson described it as "dangerous and pernicious." Mr. Grimshaw thought they might leave out of the order the words "and the amounts of the contracts." Mr. Trevor was inclined to give the amounts, and leave out the names of the contractors. The motion was adopted by 47 votes to 20.

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The Lymington Corporation and the Gas-Works.—At a special meeting of the Lymington Town Council held last Saturday week, it was resolved to promote a Bill to sanction the purchase of the undertaking of the Lymington Gas Company. The price proposed to be paid for the concern is to be determined by two arbitrators, in accordance with the provisions of the Lands Clauses Acts. No Counsel or expert witnesses are to be employed by either party. A draft agreement to this effect was approved.

The Rushden District Council and the Gas-Works.—At the meeting of the Rushden District Council last Wednesday, Mr. J. Spender moved, in accordance with notice, that the gas supply should be in the hands of the town, and that a Committee should be appointed to prepare information on the matter, and submit it to a public meeting. It was said that the Council had their hands full already, when the matter was brought forward last time. Now they only had 2½ years left to consider it, and no doubt their hands would be full then; but they must carry it through notwithstanding. Mr. T. Swindall seconded the motion. An interesting discussion followed; the general impression being that the town had been so apathetic that it was not for the Council to force the matter. A Committee was, however, eventually appointed to prepare a statement and lay it before the Council.

Wages in the Coal Trade.—The Miners' Conciliation Board met last Thursday, at the Westminster Palace Hotel. Mr. Alfred Hewlett, one of the employers' delegates from Lancashire, presided; and Mr. Pickard, M.P., Chairman of the Miners' Federation, was in the vice-chair. The Board, which came into existence on the 1st of January of the present year, with power to fix wages between the rates of 30 per cent. and 45 per cent. above the standard rate of 1888, has already fixed the rate at only 5 per cent. below the maximum; and the conference was called in order that the miners' representatives might make a proposal for a further advance of 5 per cent. The Board met at eleven o'clock, and sat until four, with slight intervals. The following resolutions were agreed to: "That the Conciliation Board recommend to the employers and workmen the continuance of the Board from Jan. 1, 1901 (the date of the expiration of the present arrangement), for a further period of three years with the present minimum and an increased maximum to 60 per cent. on the 1888 standard; and that an advance of 5 per cent. on the standard rate of wages of 1888 be granted to underground labour, and paid as and from the first making-up day in January, 1900, conditional on such extension of the period of the Board." "That the proposed advance of 5 per cent. be kept in hand until the arrangement of the Conciliation Board period has been accepted by both sides; and, if accepted, that the advance, as from the first making-up day in January, be paid on the first pay day after such acceptance." The meeting was adjourned till the 16th prox. The above was signed by Mr. Hewlett and Mr. Ratcliffe Ellis on behalf of the employers, and by Mr. Pickard and Mr. Ashton on behalf of the men. This is the highest rate that has ever been paid to miners in this country, and is higher by 5 per cent. than the rate fixed by Lord Rosebery after the great strike in 1893. The matter is referred to in our leading columns to-day.

Whitwick Gas-Works Transfer.—At the meeting of the Coalville District Council last Tuesday, Mr. Heward mentioned that he had been informed by a representative of the Whitwick Gas Company that every effort would be made to effect the transfer of the gas-works to the Council without going to arbitration. Messrs. Lass, Wood, and Drew have made an examination of the Company's books and accounts.

New Joint-Stock Companies.—The Whitchurch Canonicorum Water Company, Limited, has been registered with a capital of £1000, in £5 shares, to carry on, at the place named, in Dorsetshire, the business of water supply. The Manchester Oxygen (Brin's Patent) Company, Limited, has been formed, with a capital of £20,000, in £1 shares, to adopt an agreement with the Liquidator of the Manchester Oxygen (Brin's Patent) Company, Limited, and to carry on the business of producers, manufacturers, and dealers in oxygen, nitrogen, hydrogen, &c. The Hadley Trench and Wrockwardine Wood Lighting Company, Limited, has been formed with a capital of £10,000, to supply gas in the places named.

Sales of Shares.—At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards sold by auction some new stock of the Commercial Gas Company, ranking for a standard dividend of 7 per cent., subject to the sliding-scale (last dividend at the rate of 10½ per cent. per annum), at £233 per £100 of stock; some 4½ per cent. perpetual debenture stock realizing £140 per cent. A few fully-paid £5 original shares in the Harwich Gas Company, ranking for a maximum dividend of 10 per cent. (last dividend 8 per cent.), fetched £9 7s. 6d. each. Some 4 per cent. perpetual debenture stock of the South Essex Water Company was disposed of at £116 10s. per cent.; some 5 per cent. preference stock, at £132 per cent.; and some additional ordinary stock (7 per cent.), at £177 and £177 10s. per cent. A few £10 "B" shares (7 per cent.) in the Maidenhead Gas Company fetched £14 5s. each. On the following day, Messrs. Edwin Fox and Bousfield sold at the same place £800 of original ordinary consolidated stock of the Brighton and Hove Gas Company (last dividend 11½ per cent. per annum) at the rate of £269 per £100 of stock. At the George Hotel, Luton, Monday last week, Mr. H. Cumberland submitted for public competition 700 new ordinary £10 shares in the Luton Gas Company; representing the second issue of new capital under the Company's Act of 1890. The Auctioneer stated that, though the shares carried nominally a dividend of 7 per cent., 9 per cent. had always been paid. Spirited bidding followed; the highest price realized being £18 5s., and the lowest £16 15s. The largest purchaser was Mr. W. R. Phillips, the Engineer and Secretary of the Company, to whose management the success of the undertaking is mainly due. A sale of £5000 of new consolidated ordinary stock in the Luton Water Company, bearing a maximum dividend of 4 per cent., was held in Luton last week. The first 20 lots each consisted of £50 of stock, and fetched £58. The other 40 were £100 lots; and the highest bid was £116 15s. per lot. The total amount realized was £5808 7s. 6d. Three new ordinary (£10) shares in the Slough Gas Company were sold by auction by Messrs. Lee and Farr last Wednesday; the prices realized being £17 5s., £18 2s. 6d., and £19 17s. 6d. respectively.

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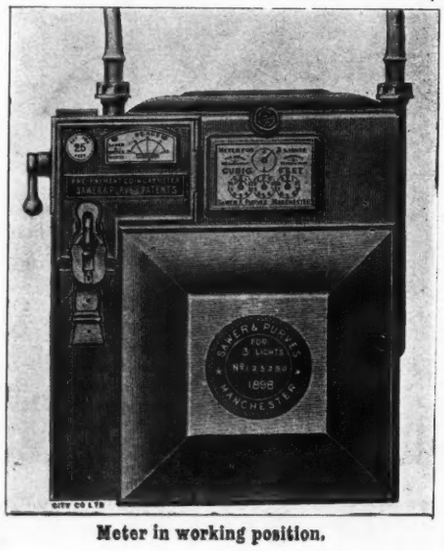

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Abolition of Gas-Meter Rents in Carlisle.—At the meeting of the Gas Committee of the Carlisle Corporation last Wednesday, it was unanimously decided to abolish meter-rents from the 1st prox., and to purchase meters belonging to consumers on a basis of a 20 years' life.

The Southport Corporation and the Water-Works.—The Southport Water Company are promoting a Bill in Parliament in the ensuing session; and the Town Council have decided to oppose it in order to secure *locus standi*. At the same time, inquiries are being made as to the terms upon which the Company would be willing to dispose of their property. This is a matter which has been frequently urged in the town; but the financial aspect has hitherto barred the way.

The Collapse of a Borehole Shaft.—The borehole shaft which was being sunk at Hayesden for the new water-works to supply Southborough, and which collapsed a fortnight ago (*ante*, p. 1334), has been abandoned and filled in. A new one has been started, and much stronger timbers are being used for supports. The kerbs will be of 9 in. by 3 in. timbers, which will be bolted together in rings. The outer pollings are to consist of 7 in. by 2½ in. battens; and about every 8 feet strengthening rings will be carried down.

Suffocation by Gas.—Last Saturday, Dr. Hunter Hughes, Coroner for South Carnarvonshire, conducted a prolonged inquiry at Talysarn into the death of a quarry rockman and a quarry labourer named Griffith Griffiths, 58, and Robert Jones, 27, who were found dead in bed on the previous Thursday morning. The men, who were employed at Dorothea, occupied a shed, standing close to the main road, which had been fitted up as a living and sleeping room. Not having been seen about since Monday, some of their fellow-workmen burst open the door of the shed, and found the men lying dead in bed; the room being filled with the odour of coal gas. A witness deposed to perceiving a strong smell of gas in the neighbourhood of the shed on Monday; and a hole made in the ground on Friday liberated gas which blazed up on a light being applied. On being exposed, the main showed that a short distance from the hole it had cracked right across. At this point it rested on a flat stone. Mr. W. Marshall, Manager of the local gas-works, said that prior to reopening the main for service all leakages had, as far as he knew, been made good. A public lamp near the shed occupied by the deceased was connected with the main some three weeks ago, and then found to be all right, and it was only lighted for public purposes after the death of the men. He corroborated the evidence of the other witness as to the breakage, but said he had never before discovered an escape at that point, nor would it have been possible for that particular spot to have been affected by the connecting of the street lamp. The Coroner said he did not consider anybody had been guilty of culpable negligence. A verdict of "Death by gas suffocation" was returned; a recommendation being made to the Gas Company (the Holyhead and North Wales Gas and Water Corporation) to see to the general state of their gas-mains in the district.

The voting among the Northumberland miners as to the re-establishment of the Conciliation Board has resulted in a large majority in favour of the proposal.

A 300-horse power gas-engine, to work with gas from blast-furnaces at the works of the Aciéries de Micheville-Villerupt, is being built in Paris.

A short time ago, the Wrexham Water Company invited tenders for 400 new £10 ordinary shares, at a minimum price of £12 per share. The tenders were opened last Tuesday; and the Directors were gratified to find that the shares had been applied for more than twice over. They were allotted at an average of £13 2s. per share.

Dividends in Messrs. Fletcher, Russell, and Co., Limited, are announced at the rate of 10 per cent. (making 10 per cent. for the year), together with a bonus of 20s. per share on the fully-paid shares, and 15s. per share on the £7 10s. paid ordinary shares. It is proposed to add £6666 to the reserve (making that fund £29,213), and to write £5000 off the property account.

In reply to inquiries regarding the Goodman gas-main stopper, referred to in the "Journal" last week (p. 1372), we may state that Messrs. Parker and Lester, of Ormside Street, Old Kent Road, have been appointed sole agents for the apparatus for the United Kingdom. The patentees have sent a sample stopper to the "Journal" office; and it can be inspected by anyone specially interested in the invention.

The Oldham Corporation have recently placed a large contract with West's Gas Improvement Company, Limited, for the fitting up of a new retort-house with West's patent regenerator settings, including nineteen through arches and settings, chimney, and stage floor, with all the necessary structural ironwork and retort-bench fittings complete, to the designs of Mr. John Chadwick, the Corporation Gas Engineer.

Owing to the distance at which many of the office staff at the works of Messrs. Willey and Co., of Exeter, reside, and the early hour at which their duties commence, Mr. Willey decided to arrange for them to obtain breakfast and dinner on the premises. It would, he thought, give them a chance of enjoying their meals, and, at the same time, contribute to their punctual return to business. Considerable expense was incurred in erecting a dining-room, with a completely fitted kitchen. The services of a *chef* were engaged; and it was arranged that breakfast should be supplied at a trifling cost, and dinner at 6d. per head. The capital outlay involved in preparing the building and the expenses of cooking are borne by the firm; but the commissariat arrangements are to be worked with the view to their becoming self-supporting.

At a recent meeting of the Glasgow Corporation Gas Committee, there were submitted the tenders received for (1) the excavation and building of the new brick-works which it had been agreed to erect on the lands of Easter Blochairn for the utilization of the clay found therein, and for (2) providing and erecting the necessary plant and machinery in the works. These having been opened and considered, it was agreed to accept (1) the offer of Messrs. Robert M'Alpine and Sons for the excavation and building of the brick-works, on the understanding that, when checked by the measurers, it should be found to be the lowest offer—the amount of the tender being £7765 9s. 4d.; and (2) the offer by Messrs. Bradley and Craven, Limited, for the plant and machinery, it being the lowest, and the amount of the contract being £2128.

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Letters, without Testimonials, but with full Particulars of past and present Employment, to be addressed to COLONIAL, care of Messrs. Street and Co., Advertising Agents, 30, CORNHILL, E.C.

HARLOW AND SAWBRIDGEWORTH GASLIGHT AND COKE COMPANY.
WANTED, a Stoker. Shovel charging. Constant Employment. Seven Days.
Apply, stating Wages required, and giving Age and Reference to
E. F. PARKER,
Harlow. Secretary.

SEASON 1899.
BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
FIRE CEMENT, PAINT, and CHEMICALS.
120 and 121, NEWGATE STREET, LONDON, E.C.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH,
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

WANTED, a Fitter, used to Main and Service Laying, Fixing Meters and Stoves, and General House Fitting. Constant work for a reliable man.
Apply, stating Age, Experience, and Wages required, and if married or single. *Copies* only of Testimonials to JOHN SMITH.
Gas-Works, Bangor, North Wales,
Dec. 9, 1899.

TO GAS-FITTERS.
THE Bombay Gas Company, Limited, require a thoroughly competent MAN to take entire charge of the work of their Fitting Department at Bombay.
Agreement for Five Years. Wages, Ten Pounds sterling per month, and a Second-Class Passage out and home.
Applications, by letter only, with *copies* of Testimonials, to be addressed to the SECRETARY of the Company, 6, Drapers' Gardens, LONDON, E.C.

WANTED, by the Grays Gas Company, Limited, Grays, Essex, a WORKING FOREMAN, accustomed to Main and Service Laying in all its branches, and Meter Taking. Must also be competent to search for and repair Leakages in Mains, take sole charge of the District and control of Men under supervision of the Manager.
Apply, not later than the 18th of December, 1899, stating Age and Wages required, with three recently dated *copies* of Testimonials, to the CHAIRMAN, Grays Gas Company, Limited, Grays, ESSEX.

BOROUGH OF COLNE.
(GAS DEPARTMENT.)
ASSISTANT MANAGER.
THE Gas Committee invite Applications for the position of ASSISTANT GAS MANAGER. Salary £100 per annum.
Any person applying may obtain list of duties which have to be performed from the undersigned.
Applications, stating Age and Experience, enclosing not more than three recent Testimonials, must be addressed to the Chairman of the Gas Committee, endorsed "Assistant," and delivered at the Gas-Works not later than Noon on Thursday, Dec. 14, 1899.
FRED. THORPE,
Engineer and Manager.
Gas-Works, Colne, Lancs.,
Nov. 28, 1899.

GUILDFORD GASLIGHT AND COKE COMPANY.
WANTED, at once, by the Directors of this Company an experienced and competent GAS MANAGER to take charge of their Gas-Works. (Annual Make, 135 millions).
He must have a practical knowledge of the Manufacture of Coal Gas, Carburetted Water Gas, and Sulphate of Ammonia, upon the most approved modern Systems, and have the entire control of the same. Salary £250 per annum. Residence, Rates, Coal, and Gas free.
Applications, in Candidates' own Handwriting, accompanied by not less than three Testimonials of recent Date, to be sent to the Chairman, Guildford Gas Company, not later than Dec. 15, 1899.
WILLIAM TITLEY,
Secretary.
Gas Offices, Guildford,
Nov. 29, 1899.

WANTED, in good condition a second-hand GASHOLDER and TANK complete to hold from 4000 to 5000 cubic feet of Gas.
Apply to J. H. GRAY, Gas-Works, WESTON-SUPER-MARE.

AIR-COMPRESSOR Wanted (good second-hand preferred), capable of producing 20/25 lbs. Pressure with 35 lbs. Steam. Steam-Cylinder about 8 inches.
Apply, by letter, to No. 3398, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS COAL ROYALTY.

TO LET—Oxclose Royalty, situated about 8 Miles from the Shipping Ports of Tyne Dock and Sunderland on the River Wear, containing 300 acres, or thereabouts.

The Seams under the Estate are: The Five Quarter Main Coal, Maudlin, Brass Hill, and Hutton Seams.

There are two Shafts sank to the Hutton Seam, which is met with 104 fathoms from the surface.

These Seams have been proved, and are being worked in the immediate neighbourhood.

For further Particulars, apply to PERCY STEPHENS, Esq., Whitworth Estates Office, Spennymoor, Co. DURHAM; or to WILLIAM LISHMAN, Esq., Mining Engineer, Witton-le-Wear, R.S.O., Co. DURHAM.

IRON ROOF for Sale, 132 feet long by 58 ft. 4 in. Span, in first-class condition.

Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

ENGINES and Exhausters, from 3500 to 30,000 cubic feet per hour, in Stock, ready for delivery. No reasonable offer refused.

J. F. BLAKELEY, Thornhill, DEWSBURY.

FOR SALE—A 1000 Cubic Feet Ex-HAUSTER, by Gwynne, in a thoroughly good condition, with Valves complete.

Apply to the SECRETARY, Gas Company, HENLEY-ON-THAMES.

RETORT IRONWORK.

RIVETED Wrought-Iron U Hydraulic MAINS, with 5-inch Pipes, 20 in. by 15 in., and 21 in. by 15 in. ∩ MOUTHPIECES in sets of Six and Seven complete. Equal to New, and Cheap.

J. F. BLAKELEY, Thornhill, DEWSBURY.

THE Broughty Ferry Gas Department have FOR SALE four 12-feet square PURIFIERS, with Four-Way Valves and Connections complete. Were erected new in 1891. Have planed Joints, and are of modern design. Have been replaced by larger ones.

ALEXR. WADDELL,
Engineer and Manager.

FOR SALE—A 3-Horse Power Crossley (Latest Patent) "OTTO" GAS-ENGINE. Quite new; has only done six months' light work.

Address No. 3385, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE.

THE Wokingham Corporation Gas-Works, having just completed the enlargement of their PLANT, have FOR DISPOSAL the following, all in good condition: Three 6 feet square PURIFIERS, STATION METER, CONDENSERS, and SCRUBBER.

Full Particulars upon application to

H. G. BATES,
Manager, &c.

FOR SALE—A Second-Hand Laycock and Clapham's Patent "ECLIPSE" WASHER-SCRUBBER, in very good condition. Size 6 ft. 9 in. by 6 ft. 9 in. by 21 ft. long, with 18-inch Valves and Connections, Engine and Driving Gear complete.

Apply to Messrs. NEWTON, CHAMBERS, AND CO., LIMITED, Thorncliffe Iron-Works, near SHEFFIELD, where the Apparatus can be seen in pieces.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TEST HOLDERS FOR SALE.

TWO 11 Cubic Feet Test Holders for SALE, with 2-inch Connections, and in working condition.

For Particulars apply to

S. DYSON.

Gas-Meter Testing Office,
Manchester.

ST. ANNE'S-ON-THE-SEA GAS COMPANY.

TO GASHOLDER MAKERS.

THE Directors of the above Company are prepared to receive TENDERS for the STEEL and IRONWORK required in the construction and erection of a STEEL GASHOLDER TANK, 92 feet diameter and 20 ft. 9 in. deep, and a TELESCOPIC GASHOLDER in Two Lifts, with Guide-Framing, Inlet and Outlet Pipes, and Connections to same.

The Specifications and Drawings may be seen on application at the Offices of Messrs. Thomas Newbigging and Son, Engineers, 5, Norfolk Street, Manchester.

Copies of the Bill of Quantities and Forms of Tender may be obtained from the Engineers on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Tenders, endorsed "Gasholder Contract, No. 3," and addressed to the Chairman, Gas Company, St. Anne's-on-the-Sea, to be sent so as to reach me not later than Twelve o'clock Noon on Tuesday, the 19th day of December, 1899.

The Directors do not bind themselves to accept the lowest or any Tender.

W. H. NUTTER,
Secretary and Manager.

Gas Offices, St. Annes-on-the-Sea,
December, 1899.

TAR.

THE Hythe and Sandgate Gas Company invite TENDERS for the surplus TAR produced at their Works at Hythe, Kent, during the Year 1900.

Tenders to be sent to me before Twelve o'clock at Noon on the 20th inst.

Particulars on application to the undersigned.

ROBERT JOHN SIDLE,
Secretary.

Hythe, Dec. 2, 1899.

CITY OF BELFAST.
(GAS DEPARTMENT.)

TENDERS are invited for the supply of WET (compensating) and DRY METERS for One Year from the 1st of January, 1900.

Meters are to be delivered to our Stores, in good order, and carriage paid.

Tenders, endorsed "Tender for Meters," must be delivered at my Office not later than Thursday, the 21st inst.

The lowest or any Tender not necessarily accepted.

SAMUEL BLACK,
Town Clerk.

THE Directors of the Worksop Gas Com-pany invite TENDERS for the purchase of the Surplus TAR, and the AMMONIACAL LIQUOR made at their Works, from the 1st of January to the 31st of December, 1900.

Tenders for Tar to state Price per Ton delivered into Purchaser's Tanks, at the Worksop Railway Station.

Tenders for Liquor, to state Price per Ton, as tested by Twaddel's No. 1 Hydrometer, delivered into Boats near the Company's Works; or Price Per Ton delivered into Purchasers' Tanks at the Railway Station.

The Directors do not bind themselves to accept the highest or any Tender.

Tenders to be sent in by the 29th day of December, 1899.

Worksop, Dec. 8, 1899.

ROCHDALE CORPORATION.

TO RETORT MAKERS AND OTHERS.

THE Gas Committee of the above Cor-poration invite TENDERS for the supply of such quantities of RETORTS and other FIRE-CLAY GOODS as may be required during the Year ending the 31st of December, 1900.

Forms of Tender and any further Information may be obtained on application to Mr. T. Banbury Ball, the Manager at the Gas-Works.

Tenders, endorsed "Fire-Clay Goods," must be sent to me not later that Noon on Wednesday, the 20th of December, 1899.

Contractors who intend to sub-let part of their Contracts must forward with their original Tenders a list of the Names of their Sub-Contractors.

By order,
JAMES LEACH,
Town Clerk, Rochdale.

Town Hall, Rochdale,
Dec. 9, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

GAS-WORKS.
TO ENGINEERS AND MAKERS OF GAS PLANT.

THE Wallasey Urban District Council are prepared to receive TENDERS for the Manufacture, delivery, and erection of PURIFIERS, at their Gas-Works, Great Float, near Birkenhead.

Plans can be seen, and a Copy of the Specification obtained, on application at the Engineer's Office, Great Float, near Birkenhead. A charge of £1 1s. will be made for each copy of the Specification, such amount to be returnable upon receipt by the Council of a *bonâ-fide* Tender.

Sealed Tenders, on the Form embodied in the Specification, addressed to the undersigned, and endorsed "Tender for Purifiers," to be delivered to me per post not later than Wednesday, the 20th inst.

The successful Contractor will be required to enter into a Bond, with approved Sureties, for the due completion of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
H. W. COOK,
Clerk to the Council.

Public Offices, Egremont,
Cheshire, Dec. 6, 1899.

WALLASEY URBAN DISTRICT COUNCIL.

ELECTRIC SUPPLY.
TO BOILER MAKERS AND ENGINEERS.

THE Wallasey Urban District Council are prepared to receive TENDERS for the construction, delivery, and fixing on Seat of One Steel LANCASHIRE BOILER, at the Electric Supply Station, Sea View Road, Liscard.

A copy of the Specification can be obtained on application to the Engineer, Mr. J. H. Crowther, at his Office, Great Float, near Birkenhead, on payment of the sum of £1 1s., which amount will be returned on receipt by the Council of a *bonâ-fide* Tender.

Sealed Tenders, on the Form embodied in the Specification, addressed to the undersigned, and endorsed "Tender for Lancashire Boiler," to be delivered per post not later than Wednesday, the 20th inst.

The successful contractor will be required to enter into a Bond, with approved Sureties, for the due completion of the Contract.

The Council do not bind themselves to accept the lowest or any Tender.

By order
H. W. COOK,
Clerk to the Council.

Public Offices, Egremont,
Cheshire, Dec. 6, 1899.

BRISTOL GAS COMPANY.

TENDER FOR TAR.

THE Directors of this Company invite TENDERS for the Purchase of the TAR to be produced at all or either of their three Stations during a period of One, Two, or Three Years, commencing on the 1st day of January, 1900.

The annual quantities of Tar produced at each of the Stations at present are, approximately, as follows:—

Avon Street	700,000 gallons.
Canons' Marsh	650,000 ,,
Stapleton	750,000 ,,

Further Particulars, with Forms of Tender, may be obtained on application to the undersigned, to whom also Tenders sealed, and endorsed "Tender for Tar," must be delivered not later than Wednesday, the 20th day of December.

JOHN PHILLIPS,
Secretary.

Chief Offices: Canons' Marsh,
Bristol, Dec. 9, 1899.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS from IRON FOUNDERS, GUN-BARREL MANUFACTURERS, TIMBER MERCHANTS, DRUGGISTS, ROPE-MAKERS, &c., for GOODS to be delivered on the Company's Works, Great Brunswick Street, in such quantities as may be required from time to time up to the 31st of December, 1900.

Samples of Goods required are open to inspection on the Works, Great Brunswick Street, and Printed Lists of Articles required can be had on application at the Company's Offices, D'Olier Street.

Tenders, endorsed "Tenders for Stores," to be lodged in my Office on or before the 27th inst.

FRANCIS T. COTTON,
Secretary.

D'Olier Street, Dublin,
Dec. 7, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

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Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
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Ash	2·04	Ash.

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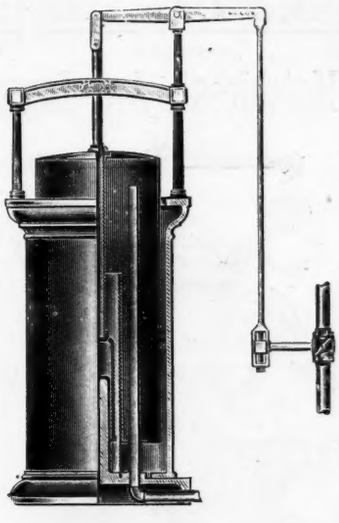

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Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 ,,
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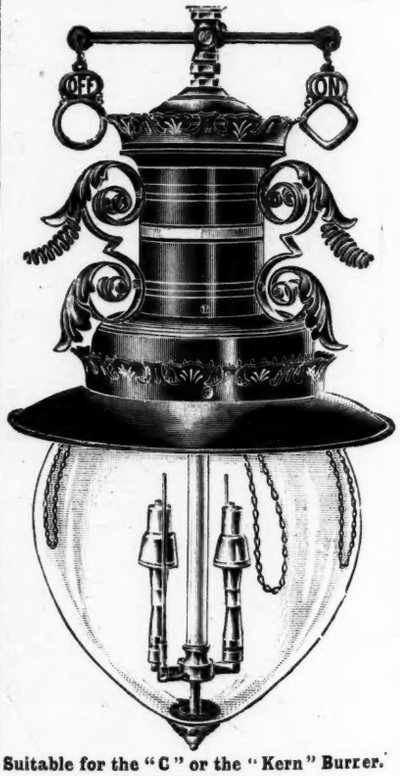

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Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.
Full Particulars may be obtained from the Sole Makers,
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ON THE CONTINUOUS SYSTEM
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"Fig. 705. SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

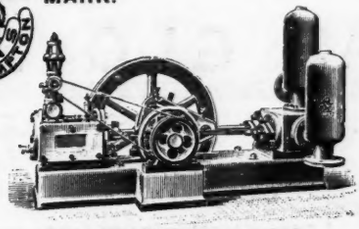

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

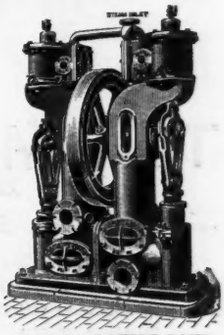

Fig. 713. "DOUBLE-RAM" STEAM-PUMP.

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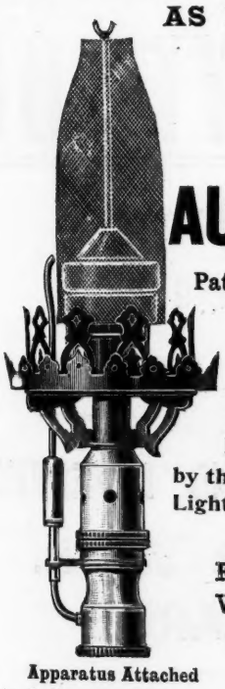

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With longer Pilot-Tube for NEW Burner . . 5s. 0d.

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NO SPECIAL PILOT-LIGHT SERVICE REQUIRED.

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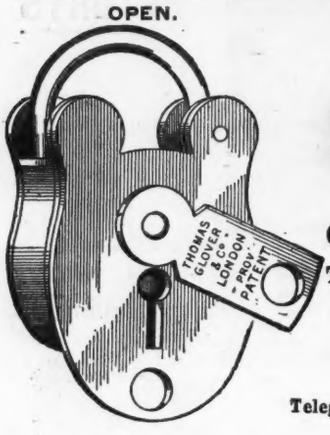

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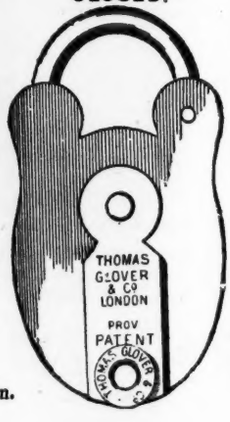

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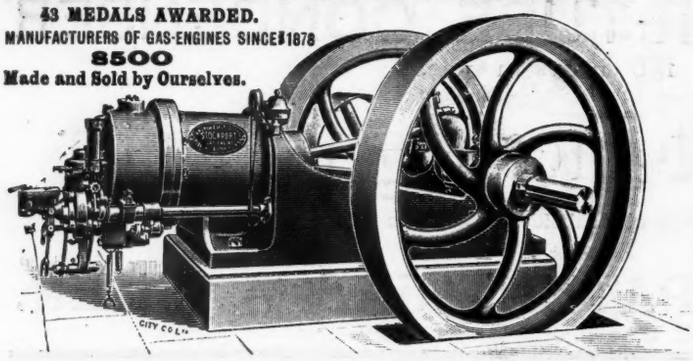

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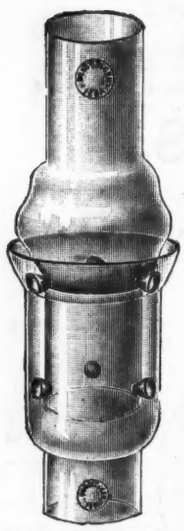

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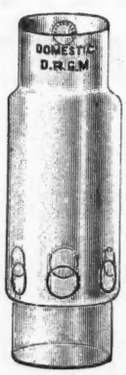

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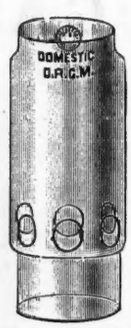

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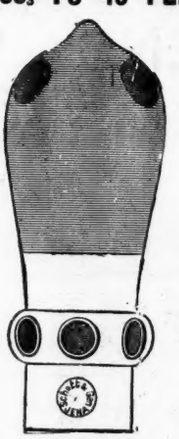

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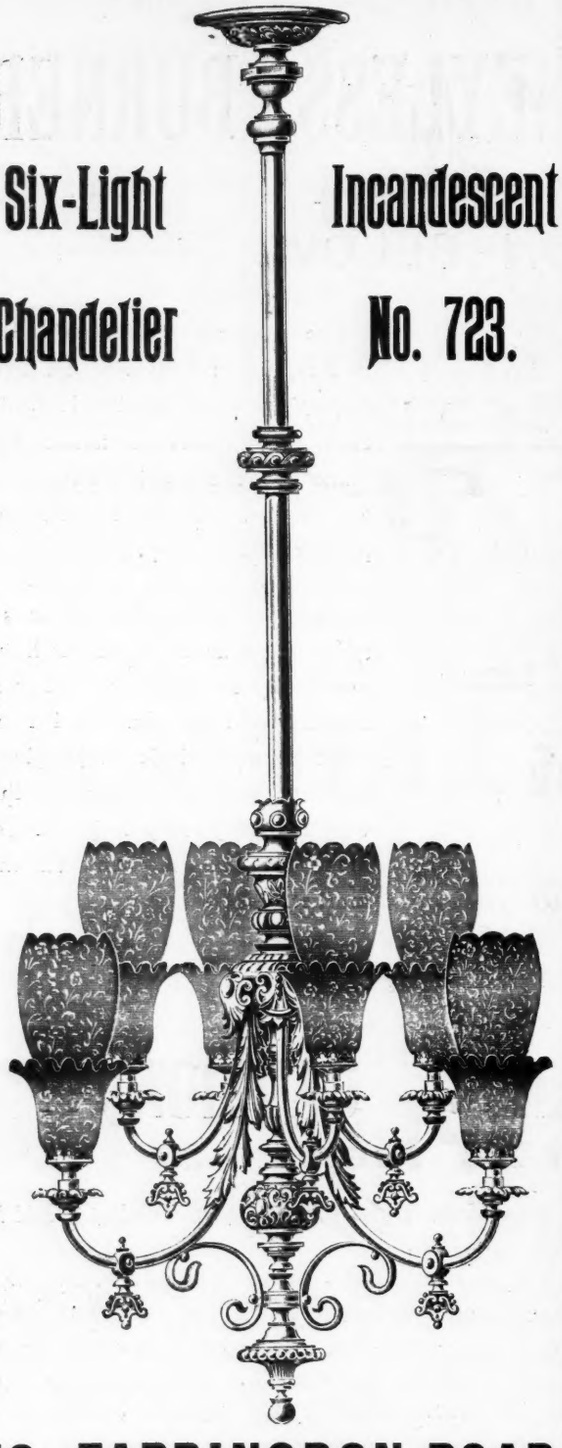

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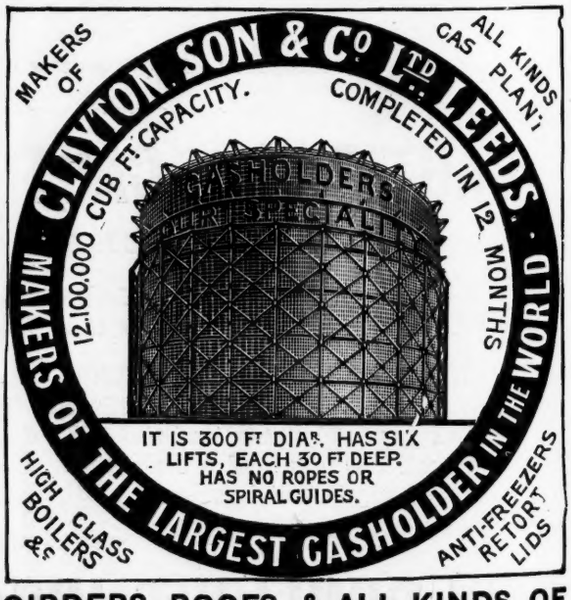
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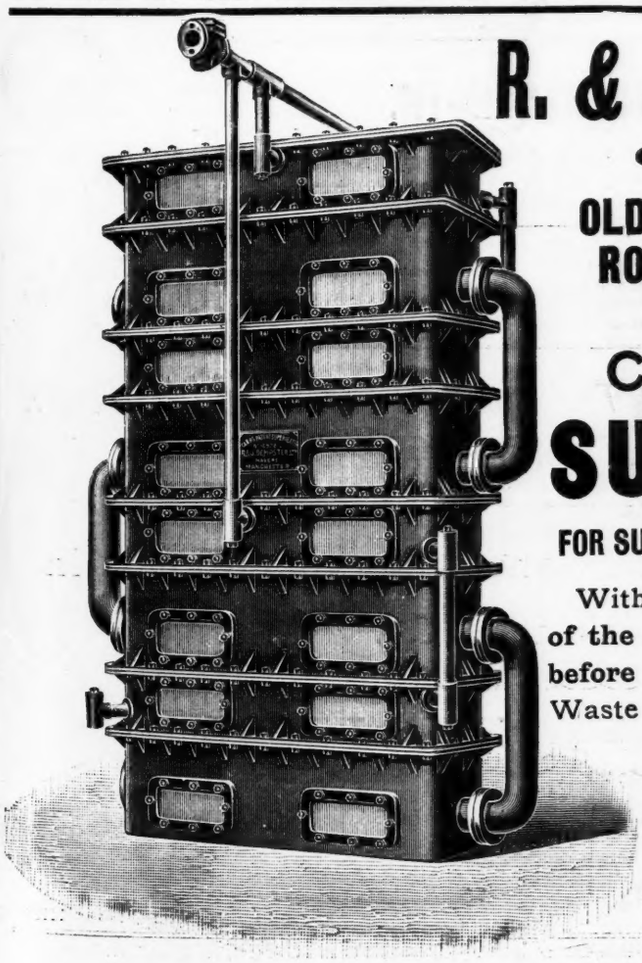

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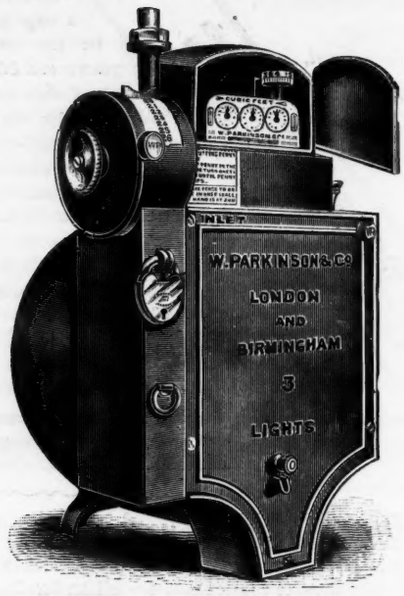

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[See also Advt. p. 1422.

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